

Daily report

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Analysis and prediction of COVID-19 for EU-EFTA-UK and other countries

Situation report 148

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and



Foreword

The present report aims to provide a comprehensive picture of the **pandemic situation of COVID-19** in the EU countries, and to be able to foresee the situation in the next coming days. We provide some figures and tables with several **indexes and indicators** as well as an **Analysis** section that discusses a specific topic related with the pandemic.

As for the predictions, we employ an **empirical model**, verified with the evolution of the number of confirmed cases in previous countries where the epidemic is close to conclude, including all provinces of China. The model does not pretend to interpret the causes of the evolution of the cases but to permit the **evaluation of the quality of control measures made in each state** and a **short-term prediction of trends**. Note, however, that the effects of the measures' control that start on a given day are not observed until approximately 7-14 days later.

We show an individual report with 8 graphs and a summary table with the main indicators for different countries and regions. We are adjusting the model to **countries and regions** with at least 4 days with more than 100 confirmed cases and a current load over 200 cases.

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Situation and highlights

Global situation

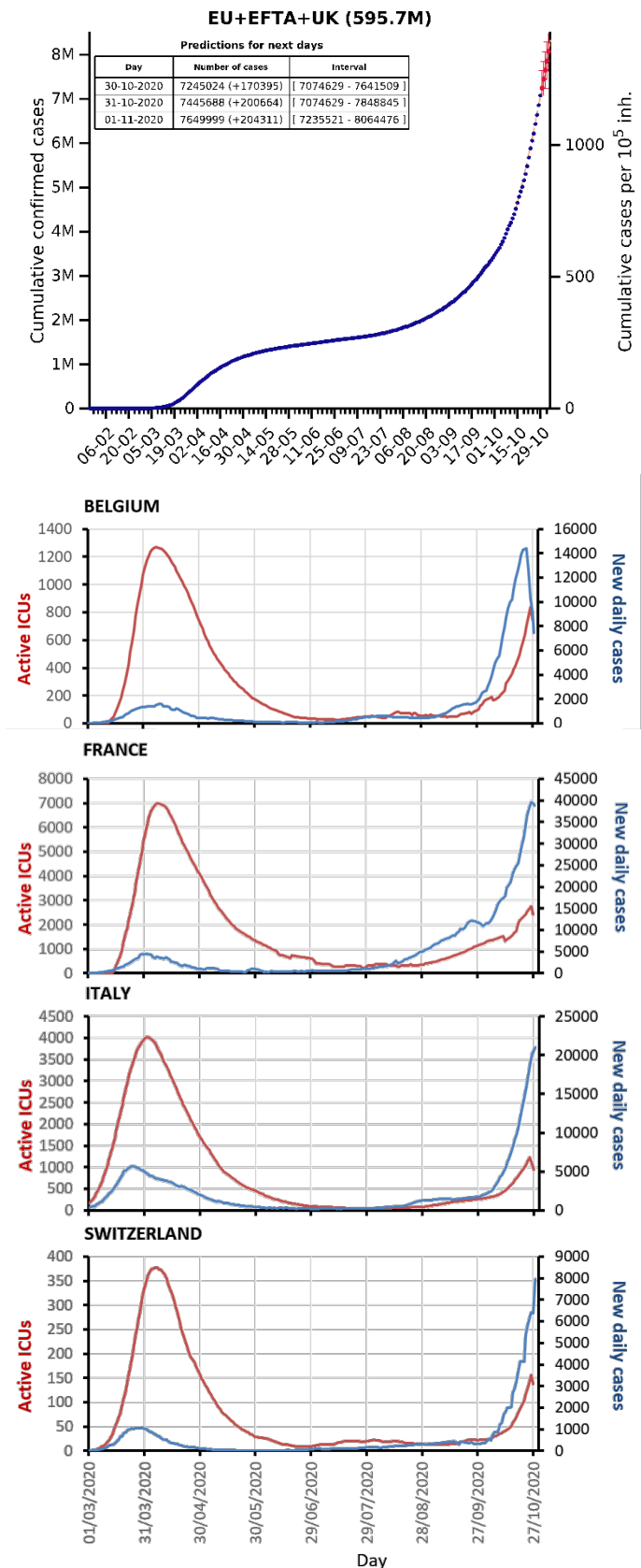
Are we like in March or April? This is a question that is asked by a large part of the population. The answer is clearly no. By then, in most of the countries only people with severe symptoms were diagnosed. In this wave, we are diagnosing some asymptomatic, presymptomatic, mild and also severe cases. Mortality is also not a good parameter to compare the epidemiological situation. We are now protecting susceptible people and, on the other hand, we have improved the way patients are treated in hospitals. Probably, and although not absolutely equivalent, hospitalization and ICUs data are the best indicators to compare situations.

In the attached figures we have simultaneously represented the number of occupied ICU beds (brown, left axis) and the number of new cases diagnosed daily (blue, right axis). We need to pay attention to the axes, which are very different.

It is clearly shown that the fraction of ICUs for new cases behaves very differently in the two waves of the epidemic. When comparing the number of occupied ICUs, we see that the situation of some countries is really very serious and comparable to the situation of March and April. In Belgium they have about 800 occupied beds, in comparison with the 1,200 that were occupied during the first wave. This represents the 75 % of the maximum achieved in April. France is close to 50%, Italy is around 25% and Switzerland reports more than 40% of the maximum occupation in the first wave. It is to be hoped that we will be able to curb the spread of the pandemic before the hospitals are collapsed again. Control measures need to be in place to prevent this situation.

Highlights

- Czech Republic and Belgium could be slowing down the propagation, therefore reaching the peak. It should be confirmed the next week.
- There are a few countries with an uncontrolled exponential growth, with a $\rho_t > 1.5$: Luxembourg, Slovenia, Switzerland, Lichtenstein, Croatia, Italy, Bulgaria, Lithuania and Norway. Nevertheless, they are growing from different levels of incidence. Among them, Norway, Lithuania and Bulgaria still report an A_{14} lower than 300 per 100,000 inhabitants.

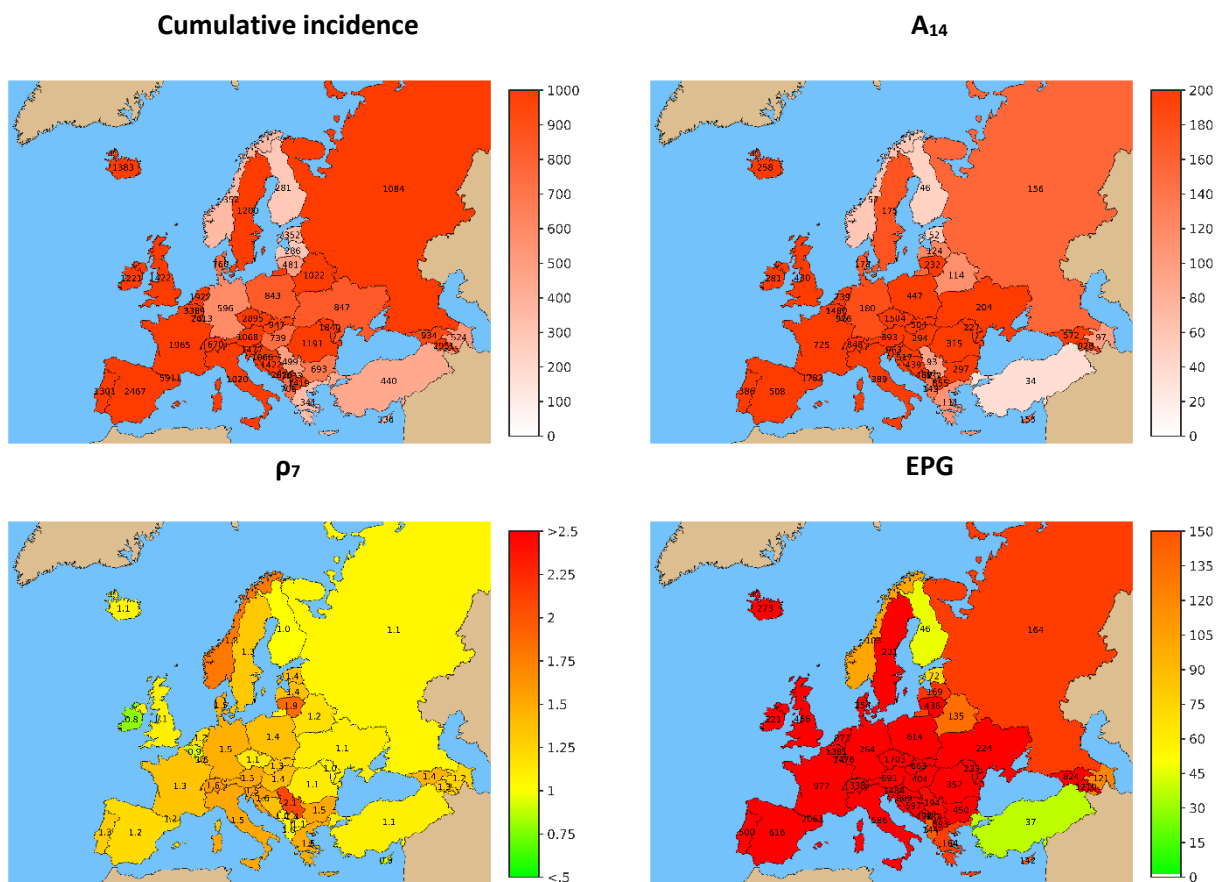


- The six countries at highest risk ($EPG > 1,000$) are Tzech Republic, Belgium, Luxembourg, Slovenia, Switzerland and Lichtenstein. All of them have an A_{14} above 800 cases per 100,000 inhabitants.

Situation and trends per country

Maps of current situation in EU countries. Colour scale is indicated in each legend.

- Cumulative incidence: total number of reported cases per 100,000 inhabitants
- A_{14} : Cumulative incidence last 14 days per 100,000 inhabitants (active cases)
- ρ_7 : Empiric reproduction number
- EPG: Effective Potential Growth ($EPG = A_{14} \cdot \rho_7$)



Tables of current situation in EU countries. Colour scale is indicated in each legend.

Incidence, mortality and epidemiological indexes.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Czech Republic	1,504.0	161,058	2,895.4	310,068	26.7	2,862	1.13	1,703	9
Belgium	1,480.0	171,522	3,383.7	392,163	97.6	11,308	0.93	1,381	9
Luxembourg	976.4	6,112	2,612.9	16,356	24.0	150	1.51	1,476	9
Slovenia	963.0	20,021	1,477.0	30,705	10.3	215	1.54	1,484	9
Switzerland	848.3	73,418	1,670.3	144,558	22.9	1,984	1.58	1,338	9
Liechtenstein	810.2	309	1,274.4	486	2.6	1	1.59	1,287	9
Netherlands	738.5	126,543	1,927.4	330,255	42.4	7,258	1.18	871	9
France	724.8	473,085	1,965.2	1,282,769	55.2	36,020	1.35	977	9
Croatia	517.4	21,241	1,066.3	43,775	12.4	511	1.56	809	9
Spain	507.6	238,709	2,466.9	1,160,083	75.8	35,639	1.21	616	9
Slovakia	503.8	27,503	947.5	51,728	3.7	200	1.32	663	9
Poland	447.3	169,302	843.4	319,205	13.6	5,149	1.37	614	9
United Kingdom	429.7	291,718	1,422.0	965,340	67.7	45,955	1.08	466	9
Austria	393.5	35,436	1,068.1	96,200	11.8	1,064	1.50	591	9
Italy	388.7	234,993	1,019.8	616,595	63.1	38,122	1.51	586	9
Malta	388.2	1,714	1,328.5	5,866	13.4	59	0.74	289	9
Portugal	385.6	39,322	1,300.6	132,616	23.8	2,428	1.30	500	9
Romania	314.7	60,550	1,190.6	229,040	35.2	6,764	1.12	352	9
Bulgaria	297.1	20,643	693.0	48,150	17.6	1,225	1.51	450	9
Hungary	293.9	28,388	739.2	71,413	17.6	1,699	1.38	404	9
Ireland	280.9	13,868	1,221.1	60,297	38.5	1,902	0.79	221	9
Iceland	258.5	882	1,382.9	4,719	3.5	12	1.06	273	9
Lithuania	232.5	6,328	480.8	13,088	5.5	150	1.87	436	9
Germany	180.4	151,137	596.4	499,694	12.4	10,349	1.46	264	9
Sweden	175.0	17,671	1,199.8	121,167	58.8	5,934	1.32	231	9
Denmark	172.8	10,011	760.2	44,034	12.4	716	1.47	254	9
Cyprus	154.9	1,870	335.5	4,051	2.1	25	0.92	142	8
Latvia	124.0	2,339	286.0	5,395	3.4	64	1.36	169	8
Greece	110.9	11,563	340.7	35,510	5.9	615	1.47	164	8
Norway	57.4	3,113	351.7	19,066	5.2	281	1.79	103	7
Estonia	52.1	691	352.1	4,671	5.5	73	1.39	72	6
Finland	46.4	2,572	280.9	15,566	6.4	354	0.99	46	6

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

Table of current situation in some EU provinces. Colour scale is indicated in each legend.

Province	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Brussels	2,249.8	27,177	4,813.2	58,144	146.6	1,771	1.28	2,874	9
Prague	1,391.5	17,700	3,491.0	44,405	NA	NA	1.05	1,466	9
North Holland	815.8	23,274	2,243.2	63,999	35.3	1,007	1.03	837	9
Bern	540.1	5,590	966.5	10,003	10.9	113	1.85	1,000	9
Madrid	405.5	26,925	4,453.2	295,726	153.0	10,159	0.98	398	9
Wien	404.1	7,665	1,542.8	29,267	17.8	337	1.34	541	9
Lisbon	378.6	10,727	1,919.3	54,373	33.4	947	1.31	494	9
Lazio	314.4	18,485	678.6	39,892	19.7	1,158	1.42	446	9
London	291.1	26,085	1,042.6	93,431	NA	NA	1.09	318	9
Berlin	270.4	10,192	775.4	29,225	6.7	253	1.49	403	9

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

⁽¹⁾ ρ_7 is the average of 7 consecutive ρ , but can still fluctuate. ⁽²⁾ EPG stands for Effective Growth Potential, which is the product of reported cumulative incidence of last 14 days per 10⁵ inhabitants by ρ_7 (empiric reproduction number). Biocom-Cov degree is an epidemiological situation scale based on the level of last week's mean daily new cases (<https://upcommons.upc.edu/handle/2117/189661>, <https://upcommons.upc.edu/handle/2117/189808>).

Situation of hospitalisations and ICUs in some EU countries. The analysis is done for those countries that report a historical series with current (active) number of patients in hospitals and ICUs¹. We provide:

- Current active hospitalisations and patients in ICU per 100,000 inhabitants.
- Current absolute number of active hospitalisations and patients in ICU.
- Rate of occupation of curative care hospital beds by Covid-19 patients (data from Eurostat 2018²), only for hospitalisations.
- Current rate of occupation with regards to the maximum Covid-19 occupation reached in this pandemic.
- Weekly increase in Covid-19 patients in hospitals and ICUs.

Country	Hospitalisations					Intensive Care Units			
	Active /10 ⁵ inh.	Active (total)	Occupation (Eurostat 2018) (%)	Occupation (historical maximum) (%)	Week-to-week Growth (%)	Active /10 ⁵ inh.	Active (total)	Occupation (historical maximum) (%)	Week-to-week Growth (%)
Belgium	53.4	6187	10.9	100.0	68.7	9.1	1057	82.3	69.8
Hungary	33.1	3197	7.7	100.0	37.7	2.6	255	97.0	20.3
France	32.5	21183	10.4	65.6	42.9	4.8	3156	44.7	28.5
Slovenia	31.7	660	7.7	100.0	68.4	5.2	109	100.0	49.1
Italy	27.3	16517	10.6	50.0	55.5	2.5	1536	37.8	51.6
Slovakia	23.6	1291	4.9	100.0	48.8	1.5	83	86.5	260.3
Switzerland	23.2	2009	6.5	89.2	84.1	2.1	180	46.6	78.7
Portugal	17.6	1794	5.3	74.9	40.4	2.6	262	14.6	158.2
Austria	16.0	1444	3.1	100.0	56.8	2.8	248	82.9	31.1

Colour scale
>20%
-20%

Colour scale
>20%
-20%

¹ <https://github.com/ec-jrc/COVID-19>

² https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_bds/default/table?lang=en

Situation and trends in some European regions³

Table of current situation in Spain by region. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Melilla	1,055.3	894	2,876.7	2,437	13.0	11	1.11	1,174	9
Navarra	1,024.4	6,658	4,799.8	31,197	103.5	673	0.90	920	9
Aragon	768.3	10,147	3,862.9	51,021	117.5	1,552	1.42	1,088	9
Castilla y Leon	698.0	16,808	3,415.4	82,245	142.6	3,435	1.33	928	9
La Rioja	684.7	2,147	3,713.2	11,644	140.3	440	1.20	819	9
Catalunya	598.2	45,254	2,649.2	200,411	78.9	5,966	1.43	854	9
Ceuta	558.7	474	1,681.9	1,427	16.5	14	1.24	694	9
Euskadi	504.6	10,990	2,821.2	61,447	93.8	2,043	1.24	627	9
Castilla-La Mancha	461.9	9,402	3,154.4	64,207	159.2	3,240	1.12	519	9
Murcia	453.2	6,742	2,167.2	32,241	11.4	170	1.05	478	9
Extremadura	417.8	4,451	1,843.1	19,636	62.2	663	1.44	603	9
Andalucía	408.5	34,420	1,411.5	118,939	26.2	2,205	1.33	542	9
Madrid	405.5	26,925	4,453.2	295,726	153.0	10,159	0.98	398	9
Asturias	331.5	3,389	1,014.3	10,369	37.7	385	1.27	422	9
Cantabria	287.4	1,672	1,553.2	9,035	40.9	238	1.57	451	9
Galicia	230.0	6,212	1,191.4	32,171	31.5	851	1.44	331	9
Comunitat Valenciana	209.1	10,400	1,229.0	61,135	34.6	1,719	1.21	253	9
Baleares	173.9	2,066	1,477.7	17,552	30.0	356	1.24	216	9
Canarias	72.7	1,604	761.0	16,798	12.1	268	1.05	77	7

Colour scale							
>150.0	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	0.0	0

Table of current situation in Sweden by region. Colour scale is indicated in each legend.

Country	Reported data				Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Jönköping	806.4	758	6,962.8	6,545	1.45	1,171	9
Örebro	741.7	1,157	2,988.5	4,662	1.72	1,275	9
Kalmar	500.0	180	3,197.2	1,151	1.56	778	9
Uppsala	493.6	849	3,301.7	5,679	1.04	515	9
Stockholm	244.2	5,724	1,453.5	34,070	1.49	365	9
Kronoberg	244.0	488	1,183.5	2,367	1.80	440	9
Östergötland	227.9	1,053	1,201.7	5,552	1.50	342	9
Skåne	198.6	2,705	698.4	9,512	1.29	257	9
Västmanland	171.9	471	1,401.1	3,839	1.81	311	9
Västra Götaland	163.7	2,799	1,412.5	24,154	1.81	297	9
Dalarna	156.4	449	1,130.0	3,243	1.46	229	9
Södermanland	146.9	376	1,176.2	3,011	1.93	283	9
Halland	134.7	443	1,018.5	3,351	1.79	241	8
Jämtland	99.2	129	1,258.5	1,636	0.63	63	7
Norrbottn	98.8	247	861.6	2,154	1.02	101	7
Blekinge	82.5	132	613.1	981	1.97	162	7
Gotland	81.4	48	705.1	416	2.43	198	8
Gävleborg	78.0	224	1,315.7	3,776	1.72	134	7
Värmland	77.6	218	570.8	1,604	1.33	103	7
Västerbotten	67.2	184	488.3	1,338	1.82	122	7
Västernorrland	51.4	126	867.8	2,126	1.38	71	6

Colour scale					
>150.0	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	0.0	0

³ <https://github.com/ec-jrc/COVID-19/tree/master/data-by-region>

Table of current situation in Belgium by region. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Wallonia	2,721.6	99,174	4,636.9	168,969	113.1	4,122	1.33	3,632	9
Brussels	2,249.8	27,177	4,813.2	58,144	146.6	1,771	1.28	2,874	9
Flanders	1,084.4	71,449	2,404.4	158,425	82.2	5,415	1.39	1,509	9

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

Table of current situation in Italy by region. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Valle d'Aosta	981.7	1,237	2,224.6	2,803	124.6	157	1.16	1,140	9
Liguria	597.0	9,259	1,645.6	25,523	111.7	1,733	1.37	820	9
Bolzano	560.5	2,920	1,379.5	7,187	58.3	304	1.59	889	9
Lombardia	535.6	53,882	1,694.9	170,526	172.5	17,357	1.62	867	9
Piemonte	514.3	22,404	1,433.5	62,445	98.8	4,305	1.51	774	9
Umbria	512.9	4,524	938.0	8,273	12.9	114	1.46	748	9
Toscana	464.1	17,311	991.7	36,992	34.8	1,297	1.68	778	9
Campania	433.2	25,137	789.1	45,782	10.8	624	1.37	596	9
Trento	336.6	1,811	1,552.6	8,353	80.3	432	1.54	519	9
Veneto	329.4	16,162	1,001.5	49,135	48.0	2,355	1.66	546	9
Lazio	314.4	18,485	678.6	39,892	19.7	1,158	1.42	446	9
Abruzzo	285.6	3,747	700.7	9,193	40.7	534	1.56	446	9
Friuli Venezia Giulia	275.7	3,350	752.4	9,142	31.4	382	1.81	498	9
Emilia-Romagna	264.6	11,799	1,132.4	50,494	103.0	4,593	1.69	446	9
Marche	231.5	3,531	813.7	12,409	66.1	1,008	1.92	445	9
Molise	193.1	591	458.8	1,404	10.1	31	1.47	283	9
Sardegna	189.6	3,109	519.9	8,526	12.5	205	1.32	251	9
Sicilia	174.8	8,741	380.7	19,033	9.2	459	1.32	232	9
Puglia	153.6	6,189	405.9	16,353	17.3	699	1.51	231	9
Basilicata	147.0	826	338.3	1,901	8.4	47	1.26	185	8
Calabria	100.3	1,952	226.0	4,400	5.7	111	1.58	158	8

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

Situation and trends in other countries

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
United Kingdom	429.7	291,718	1,422.0	965,340	67.7	45,955	1.08	466	9
Argentina	429.6	194,161	2,529.5	1,143,211	67.4	30,442	0.90	388	9
United States of America	291.9	966,269	2,702.7	8,946,154	69.1	228,668	1.17	341	9
Colombia	228.2	116,140	2,069.7	1,053,122	60.8	30,926	1.12	256	9
Ukraine	203.9	89,178	847.0	370,417	15.7	6,868	1.10	224	9
Russia	155.9	227,530	1,083.8	1,581,693	18.7	27,301	1.05	164	8
Israel	154.7	13,389	3,623.0	313,590	29.0	2,511	0.73	113	8
Brazil	152.9	324,990	2,584.9	5,494,376	74.8	158,969	1.09	167	8
Iraq	126.7	50,953	1,162.9	467,755	26.9	10,815	1.00	127	8
Qatar	116.2	3,347	4,586.9	132,150	8.0	231	1.01	117	8
Peru	114.8	37,854	2,722.3	897,594	104.2	34,362	0.88	101	7
Belarus	114.2	10,795	1,021.5	96,529	10.3	973	1.18	135	8
Chile	107.5	20,554	2,652.5	507,050	73.9	14,118	0.94	101	7
Canada	97.5	36,810	605.5	228,542	26.7	10,074	1.10	107	7
Iran	94.2	79,106	710.7	596,941	40.6	34,113	1.27	120	7
Ecuador	90.4	15,942	942.6	166,302	71.5	12,622	1.42	128	7
India	53.1	718,383	597.8	8,088,851	8.9	121,090	0.87	46	6
Mexico	51.3	66,084	708.0	912,811	70.4	90,773	1.21	62	6
Philippines	25.8	28,237	344.0	376,935	6.5	7,147	0.90	23	4
Indonesia	20.1	54,888	147.7	404,048	5.0	13,701	0.96	19	4
Saudi Arabia	15.6	5,420	995.2	346,482	15.4	5,363	1.00	16	3
Pakistan	4.7	10,309	150.4	332,186	3.1	6,795	1.23	6	2

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

⁽¹⁾ ρ_7 is the average of 7 consecutive ρ , but can still fluctuate. ⁽²⁾ EPG stands for Effective Growth Potential, which is the product of reported cumulative incidence of last 14 days per 10⁵ inhabitants by ρ_7 (empiric reproduction number). Biocom-Cov degree is an epidemiological situation scale based on the level of last week's mean daily new cases (<https://upcommons.upc.edu/handle/2117/189661>, <https://upcommons.upc.edu/handle/2117/189808>).

Analysis: On the estimation of the value of reproductive number inside schools in Catalonia (Spain).

In previous reports we have discussed that the number of groups in quarantine scales with the incidence outside of the school. Here we check how robust our results are with the help of numerical simulations to obtain the propagation inside the groups that better fits the observed infections inside the groups. We have data from all the group of students which has gone into quarantine and information of the number of cases measured. With this information and numerical simulations, we will be able to gain important insights on the propagation of Covid-19 in schools during the beginning of the school times.

In next assessment we are going to evaluate if our estimations are robust and are kept during the last states of the epidemics after the big increase observed during the last weeks in Barcelona. It is important to already note that the distribution of contacts inside the schools was obtained from the health institute from the local Government of Catalonia and refers to the initial weeks of school in Catalonia. We are going to process the data from the last weeks in subsequent assessments

Numerical simulations

The numerical simulations consist on a stochastic method to evaluate the probability of contagious based in a probability distribution and the probability of contagious R (see Report 131¹), where the probability of infections is proportional to the time of exposition (see Fig1 and Report 142²).

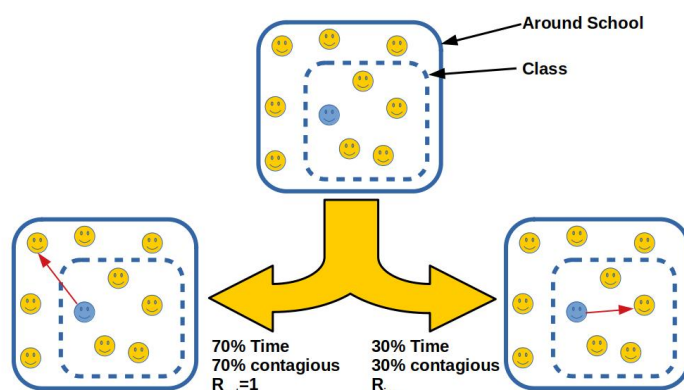


Figure 1. Outline of the class and the environment. The probability to infect somebody inside or outside the school depends on the time spent inside and outside, respectively.

Therefore, the **total probability of contagious** is given by the time of the kid inside and outside of the school.

$$R = 0.3R_{ins} + 0.7R_{out}$$

As control parameter we **assume constant incidence outside of the school ($R_{out}=1$)**. The propagation inside the school may depend on the measures employed inside of the school, which may be perfect, i.e. $R_{ins} = 0$ (related with the crystal box approach, see Report 142²), or much worse than outside, for example $R_{ins} = 3$.

Note also that we are considering **perfect bubble groups** which avoid the contagious among the different isolated groups inside the school.

¹ <https://upcommons.upc.edu/handle/2117/329867>

² <https://upcommons.upc.edu/handle/2117/330384>

Effects of $R_{ins} > 0$ in the confinement of groups

As we have argued previously in other analyses, the infections inside the school do not substantially increase the number of groups with at least one student infected if there are no connections among the groups inside the school, see the evolution in Fig 2. However, the increase in new cases due to a larger value of R_{ins} increases the probability of detection, because there are more infected students which may be detected because they show symptoms or because of contact tracing from outside.

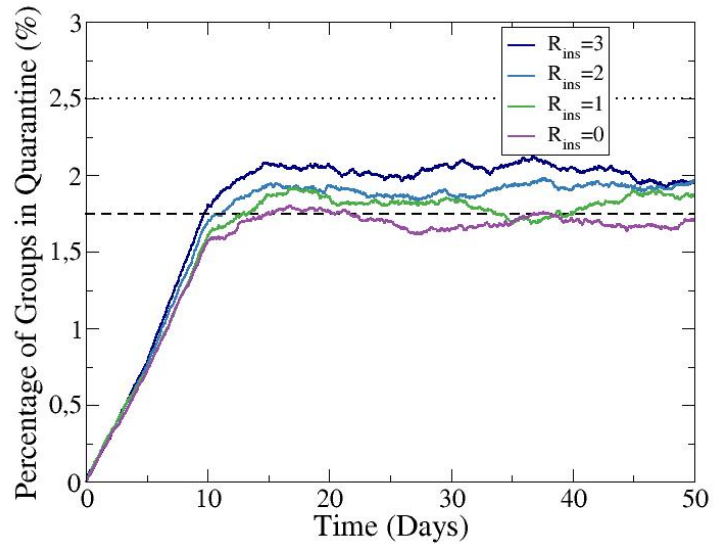


Figure 2. Evolution of the Number of confined groups during 50 days for different values of the probability of infection (R_{ins}) keeping the value of $A_{14}=250$ per 10^5 inh. Dashed line corresponds to the estimation of groups in quarantine, and dotted line is the case where all the kids infected are detected, see Report 142³.

For the study of the increase in the detection, we run some numerical simulations with the simulator previously discussed, see Report 131⁴. We count the total number of confined groups during 50 days. After a characteristic time, which depends on the number of days of the quarantine, **we obtain a stationary value around a characteristic value**. With the increase in the value of R_{ins} , the number of groups detected increases, because for larger values of the probability of contagion, an asymptomatic kid, which otherwise may be no detected, infects other kids which may be detected because become symptomatic.

Estimations of the effect of quarantine

Next, we obtain from the simulation for four representative cases: $R_{ins} = 0$ (no contagions inside the school), $R_{ins} = 1$ (same infection rate as outside, with constant incidence), $R_{ins} = 2$ and $R_{ins} = 3$ (higher contagion rates than outside). Table 1 shows, for each scenario, the total number of kids infected outside in comparison with the kids infected inside of the school.

Table 1: Simulation outcomes of 4 scenarios with no contagions inside the school ($R_{ins} = 0$), same contagions as outside ($R_{ins} = 1$, constant incidence), and higher contagion rate than outside the school ($R_{ins} = 2$ and $R_{ins} = 3$).

	INFECTION CHAINS			Estimated infected Percentage of infected	
	Person outside → kid inside	Kid inside → kid inside	Kid inside → person outside	without quarantine	with respect to non- quarantine conditions
$R_{ins} = 0$	9965	0	3537	6775	52%
$R_{ins} = 1$	9775	1573	3887	9775	56%
$R_{ins} = 2$	9887	3186	4359	12853	59%
$R_{ins} = 3$	10028	5486	4712	16044	63%

³ <https://upcommons.upc.edu/handle/2117/330384>

⁴ <https://upcommons.upc.edu/handle/2117/329867>

The number of kids infected outside is independent on the probability of infection inside the school, R_{ins} , and therefore is constant apart from the fluctuations due to the proper stochasticity of the method. The number of kids infected inside of the school obviously depends on this probability, and it substantially changes with R_{ins} . The 70% of the time the kids are outside and they infect other people with $R_{out} = 1$. Therefore, the quantity of people infected by kids outside the school vary slightly because the great majority of kids are infected outside the school and it remains almost constant for the four cases.

The number R informs about the estimated number of infected people from the number of infected kids. As first approach, we can estimate how many people can be infected from the index cases, see table 1, and compare with the actual value of infected people (which may be actually originated from secondary cases) to evaluate the effect of the quarantines. **At least a 40%-50% of the possible infections are avoided due to the use of quarantines**, provided that quarantine conditions are met, i.e., the kids are perfectly isolated.

Estimations of secondary infections

Next, we examine with stochastic simulations the number of infected students inside the group before the group goes into quarantine. That is, once a positive case is found, the whole bubble groups is screened and possible contagious chains inside the school can be identified, if more positives are found. These diagnoses occur during the protocol of quarantining a group. Therefore, this information is available from quarantined groups in Catalonia, extracted from the local government documents. We have explored different values of R_{ins} , and compare with the data provided by the Catalan government.

In Figure 3 this comparison is shown for three different values of the probability of infection inside of the school ($R_{ins} = 1$, $R_{ins} = 2$ and $R_{ins} = 3$). The probability of infection outside the school remains $R_{out} = 1$ (i.e., constant incidence). The values are representative of three different situations. The scenario with $R_{ins} = 0$ was not explored because it would provide one single case per quarantined group (a single bar in the Figure 3).

We observe that, although it is not perfect, the best fitting of the results corresponds to the case of $R_{ins} = 1$. Intermediate values ($0 < R_{ins} < 1$) could be screened to look for a better fitting.

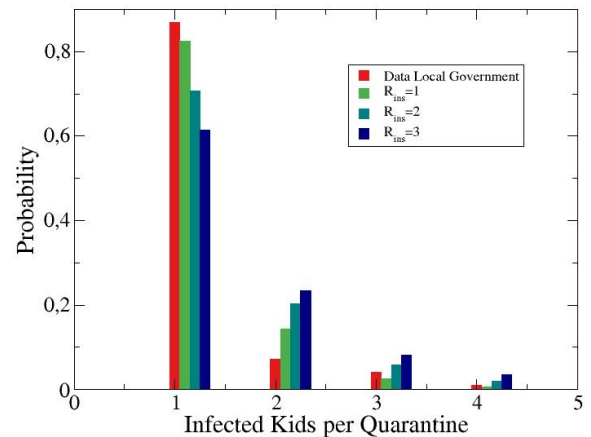


Figure 3: Probability of the number of infected students in a confined group for different values of the probability of infection (R_{ins}) and compared with the official data submitted by health institution of the local government of Catalonia.

For higher values of R_{ins} , the distribution of secondary cases would be very different than the observed by the government institutions.

Evolution under growing incidence

We can also study the evolution of the percentage of confined groups for non-constant conditions. For example, we can vary the incidence outside the school in a similar way that the change in Catalonia in the

last two months, growing from $A_{14}=150$ per 10^5 inh. to $A_{14}=1000$ per 10^5 inh. in the last days. Although it is not real, as first approximation, we have considered a lineal growth of A_{14} .

The results of the simulations for four different values of R_{ins} are shown in Fig 4. **The number of confined groups does not depend strongly on the infection inside and the dynamics is basically controlled by the incidence outside of the school.**

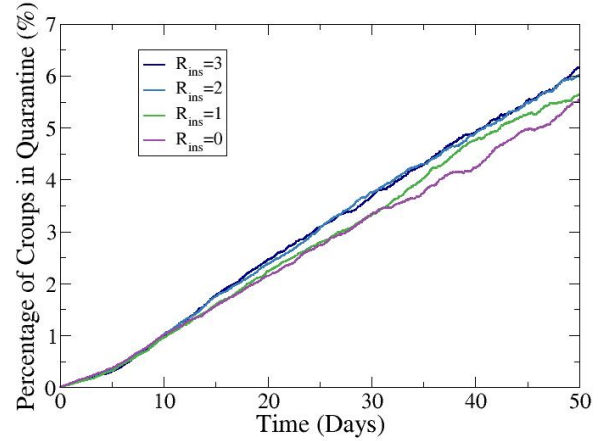


Figure 4. Evolution of the percentage of confined groups during 50 days for different values of the probability of infection (R_{ins}) for linearly changing value of A_{14} , from $A_{14}=150$ to $A_{14}=1000$.

Conclusions

If the groups are isolated inside the school, the total number of confined groups is closely related with the local incidence and it is finally tuned by the contagion rate inside the school (see Figure 3), which increases the probability to find an asymptomatic scholar inside the group by the detection of other infected students due to a larger value of R_{ins} . The use of bubble groups together with quarantines can prevent around 40% or 50% of the infections, as it is shown in table 1.

The evolution under large changes of the incidence outside the school does not substantially depend on the propagation inside of the school, in other words, it does not depend on the parameter R_{ins} .

Although our model is simple and no strong conclusions can be extracted yet, it indicates that propagation inside schools was not larger than outside the schools. Such result coincides with the examinations done by the study performed by *Sant Joan de Deu*⁵, where they obtained a propagation inside the summer camps of $R_{local} = 0.3$. This corresponds in our case to the probability of contagion inside school of $R_{local} = 0.3 \cdot R_{ins} = 0.3$ (i.e., $R_{ins} = 1$).

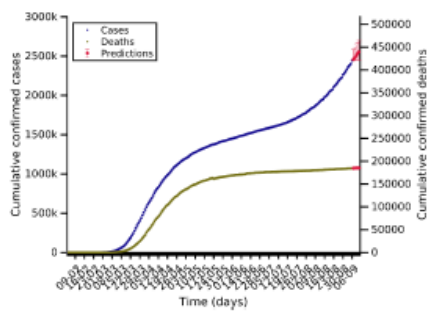
Although these estimations are coherent with a small propagation of the epidemic inside of the schools, we have to be aware that data is from 1 month ago and the dynamics may have changed during the last weeks, as it has happened with the incidence in Catalonia. We would like to confirm our previsions in future evaluation of the epidemic in the last weeks.

⁵ <https://www.sjdhospitalbarcelona.org/en/kids-corona-study-reveals-low-infection-rate-summer-camps>

Legend: Countries' reports details

Reported cumulative cases (blue) and deaths (brown), together with predictions (red)

EU+EFTA+UK 06-09-2020. Pop: 2632.4M. Cumulative incidence: 93/10⁵

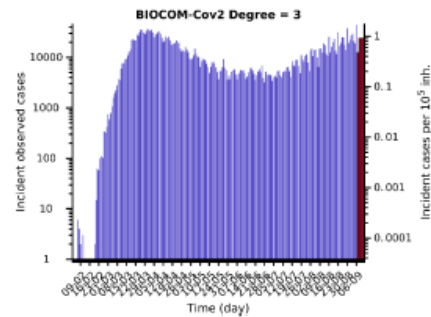
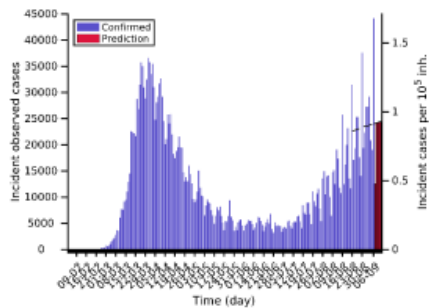


Predictions for next days		
Day	Number of cases	95% confidence interval
07-09-2020	2458068 (+125771)	[2445493 - 2583840]
09-09-2020	2568527 (+242758)	[2443493 - 2633890]
11-09-2020	2553558 (+244355)	[2445493 - 2799209]

Current indicators		
R_{eff}	RPI	CFR
1.3	14	1.17 %

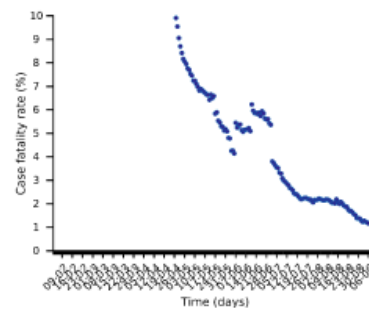
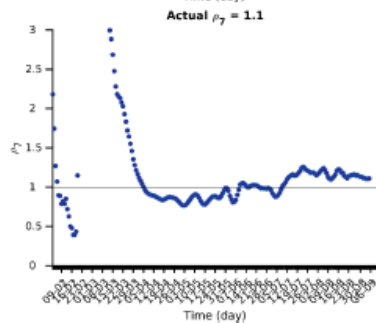
Predictions and indicators

Incident observed cases and predictions.



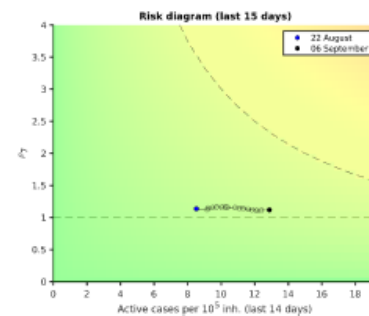
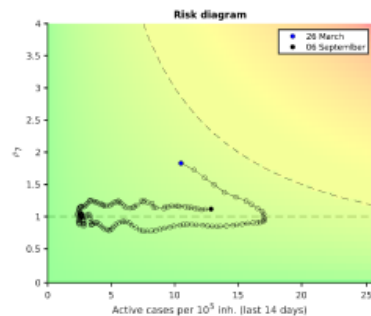
Incident observed cases in a logarithmic scale, with Biocom-Cov degree.

Evolution of empiric reproduction number ρ_T



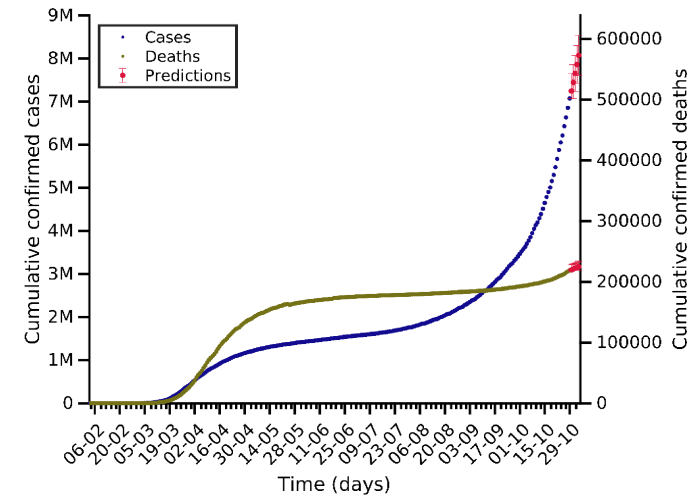
Case fatality rate

Risk diagram



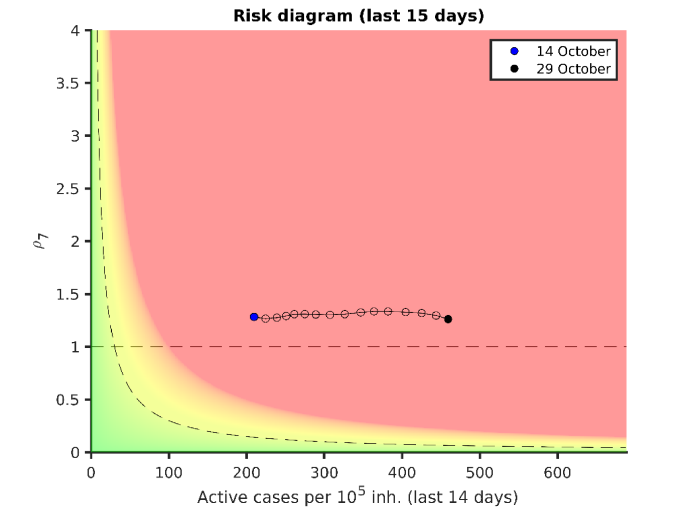
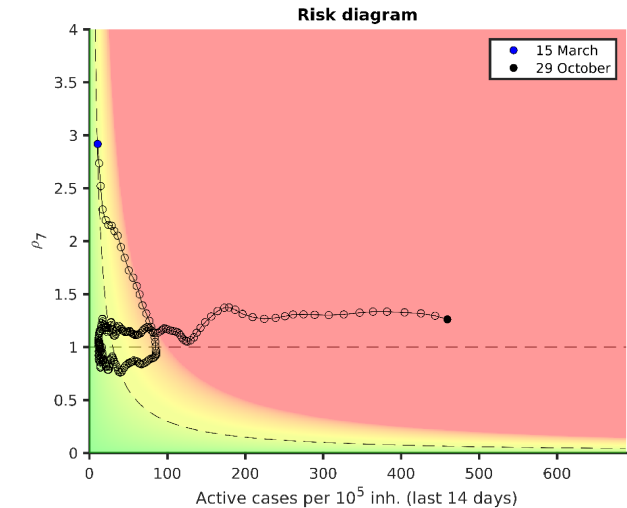
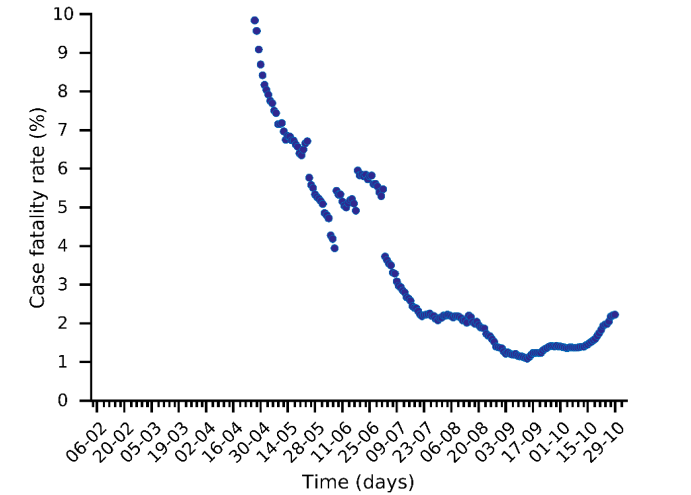
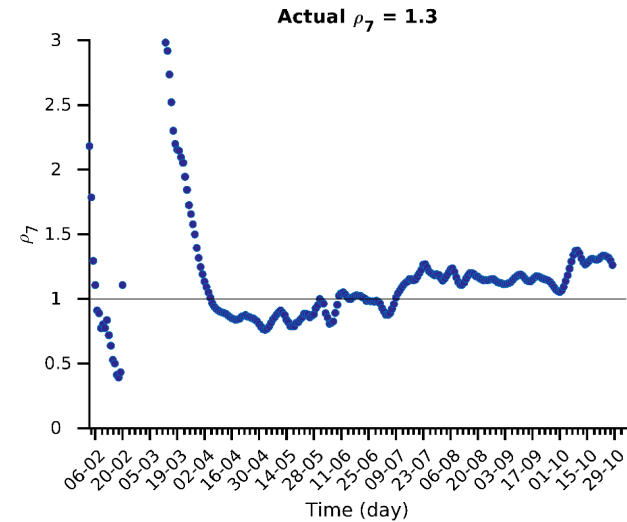
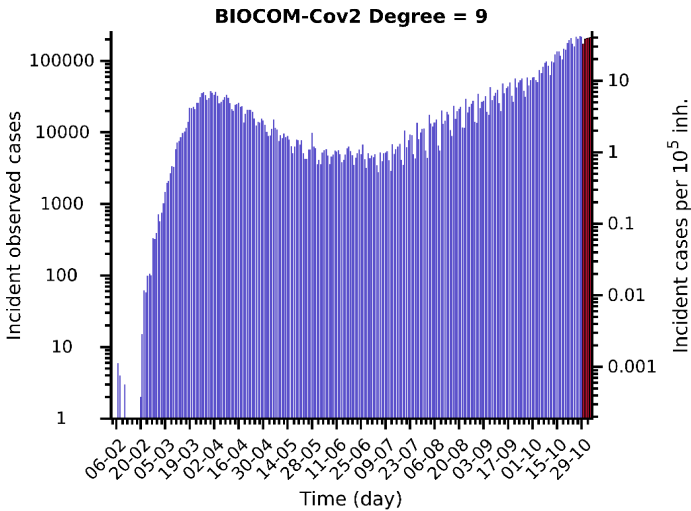
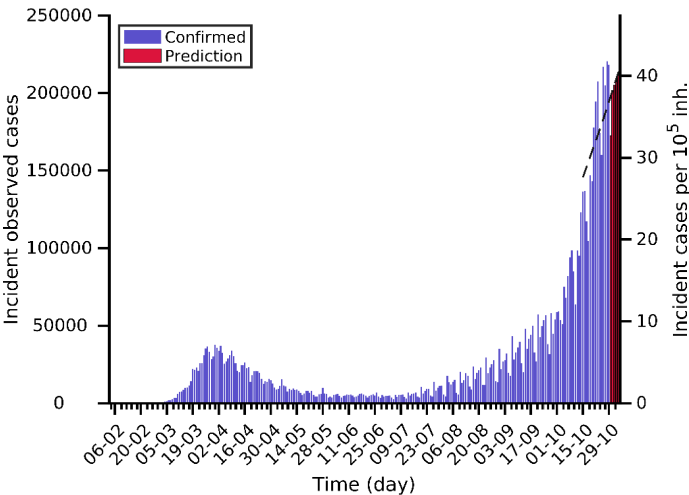
Risk diagram of last 15 days

**(1) Analysis and prediction of COVID-19
for EU+EFTA+UK**

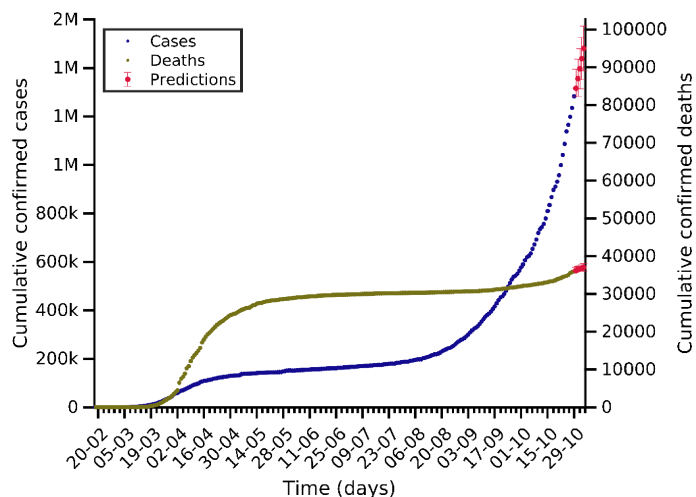


Predictions for next days		
Day	Number of cases	95% Confidence Interval
30-10-2020	7247050 (+172421)	[7074629 - 7647702]
01-11-2020	7653932 (+205279)	[7233614 - 8074249]
03-11-2020	8075575 (+212674)	[7609523 - 8541628]

Current indicators		
A ₁₄	EPG	CFR
459	579	2.22 %



France 29-10-2020. Pop: 65.3M. Cumulative incidence: 1965/10⁵

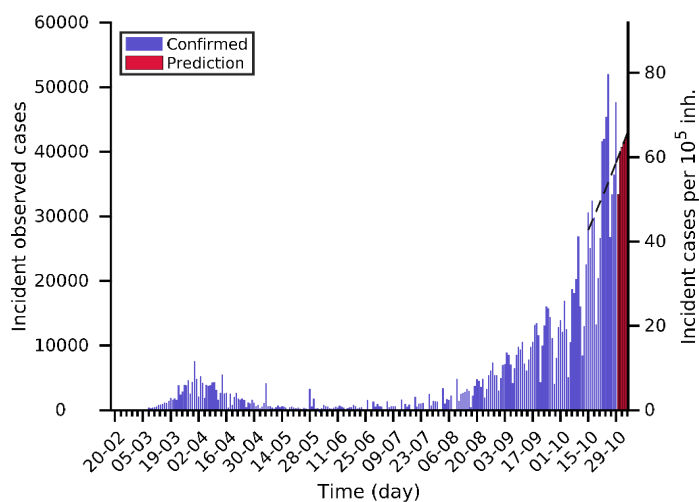


Predictions for next days

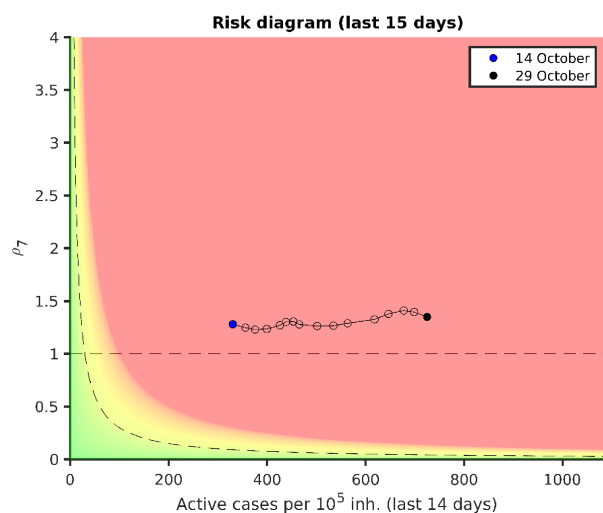
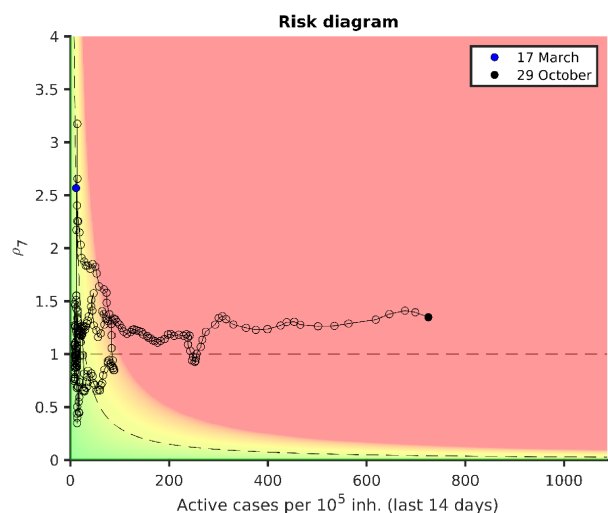
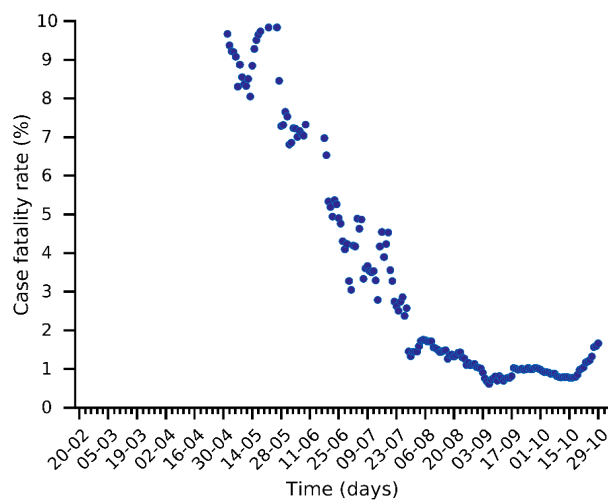
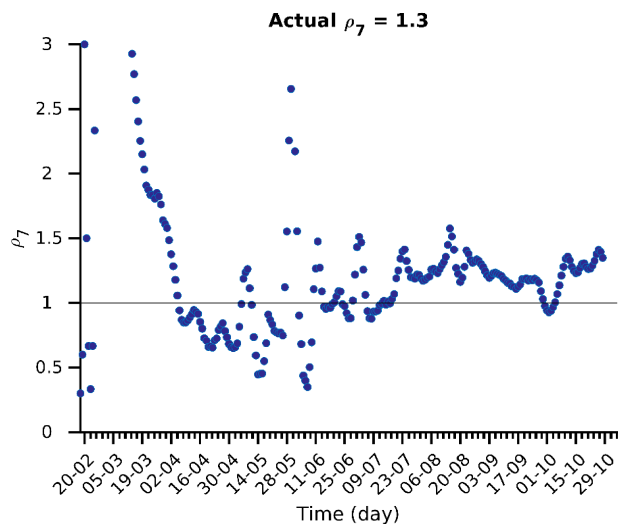
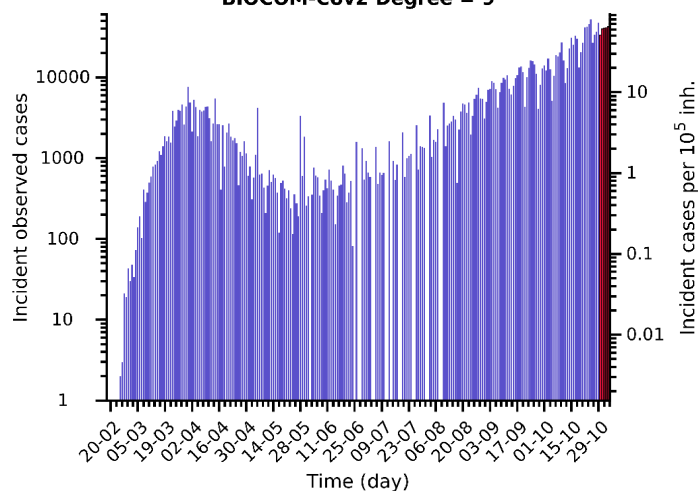
Day	Number of cases	95% Confidence Interval
30-10-2020	1316139 (+33370)	[1282769 - 1395006]
01-11-2020	1396744 (+40700)	[1313924 - 1479564]
03-11-2020	1480542 (+42300)	[1388458 - 1572625]

Current indicators

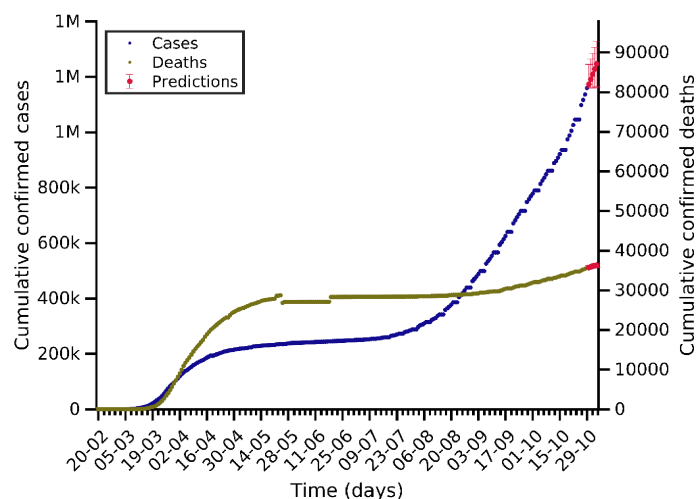
A ₁₄	EPG	CFR
725	977	1.66 %



BIOCOM-Cov2 Degree = 9



Spain 29-10-2020. Pop: 47.0M. Cumulative incidence: 2467/10⁵

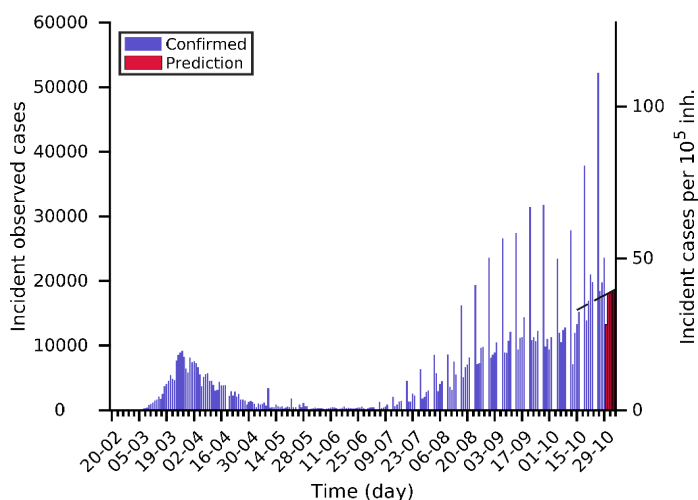


Predictions for next days

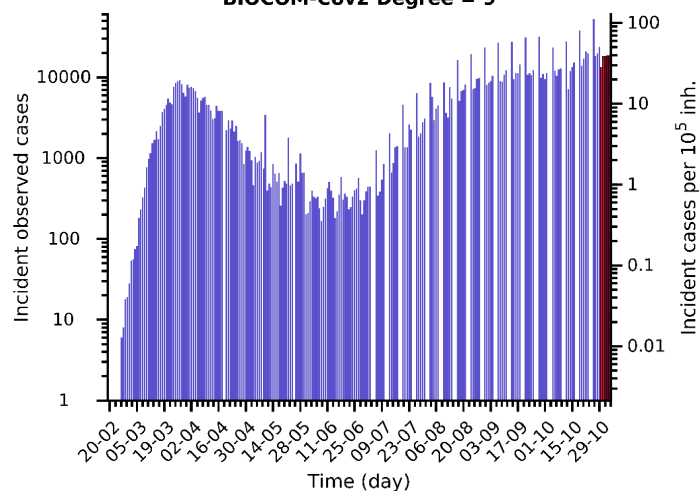
Day	Number of cases	95% Confidence Interval
30-10-2020	1173346 (+13263)	[1160083 - 1245455]
01-11-2020	1209686 (+18250)	[1160083 - 1284949]
03-11-2020	1246663 (+18568)	[1164370 - 1328956]

Current indicators

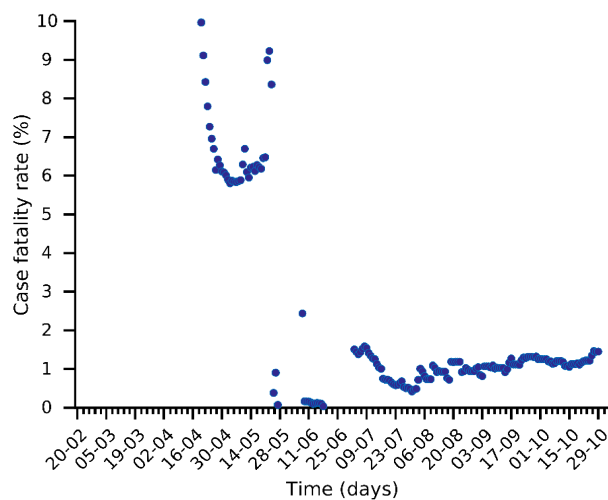
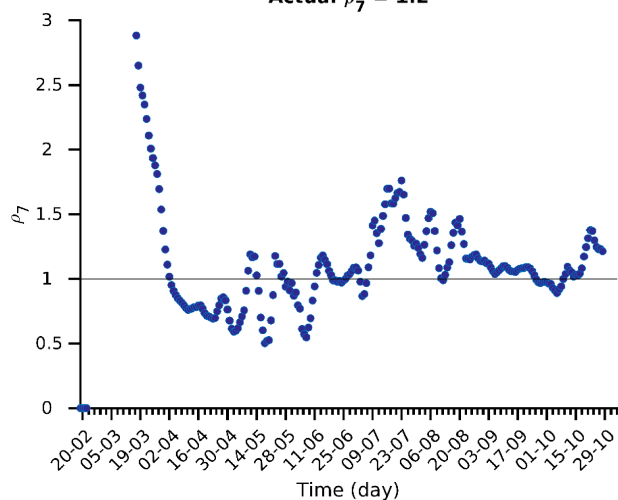
A ₁₄	EPG	CFR
508	616	1.45 %



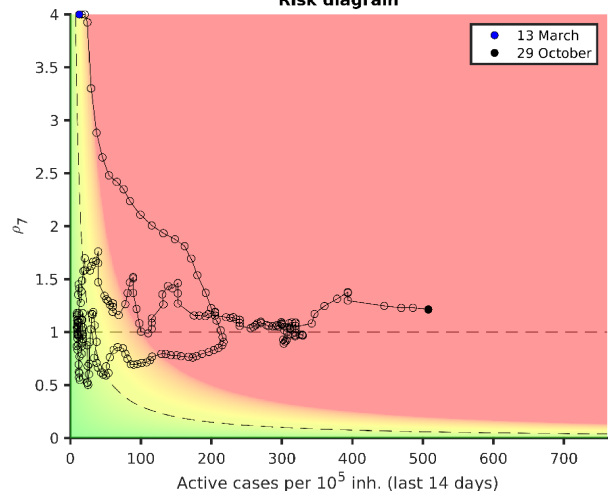
BIOCOM-Cov2 Degree = 9



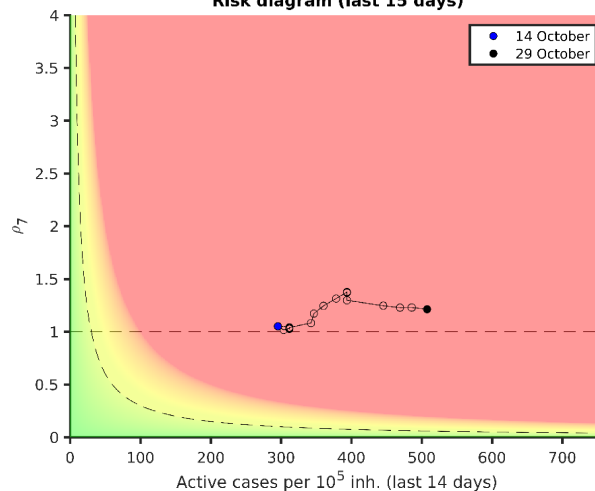
Actual $\rho_7 = 1.2$



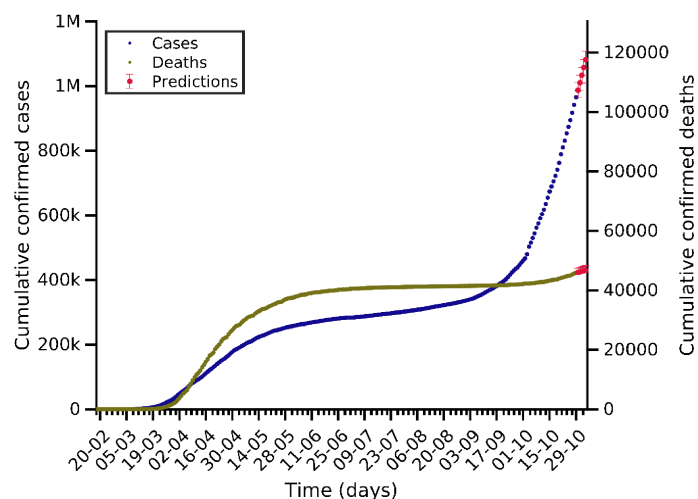
Risk diagram



Risk diagram (last 15 days)



UK 29-10-2020. Pop: 67.9M. Cumulative incidence: 1422/10⁵

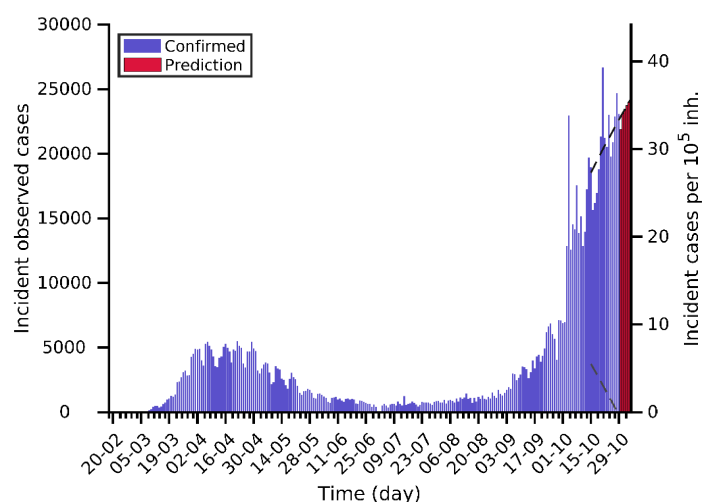


Predictions for next days

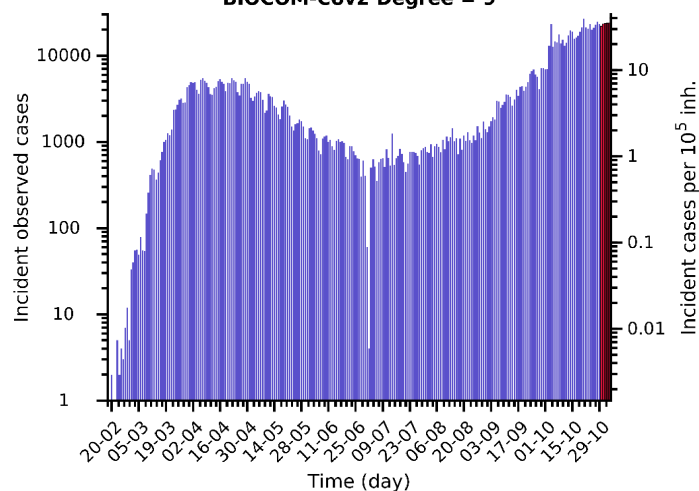
Day	Number of cases	95% Confidence Interval
30-10-2020	987221 (+21881)	[965340 - 1010312]
01-11-2020	1033867 (+23458)	[1009710 - 1058023]
03-11-2020	1081581 (+23989)	[1055006 - 1108156]

Current indicators

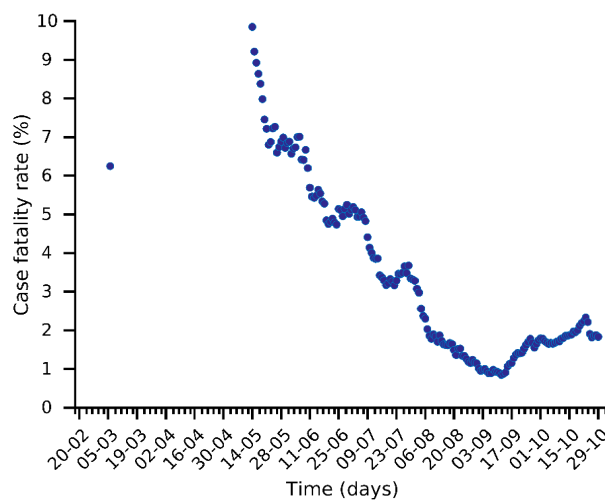
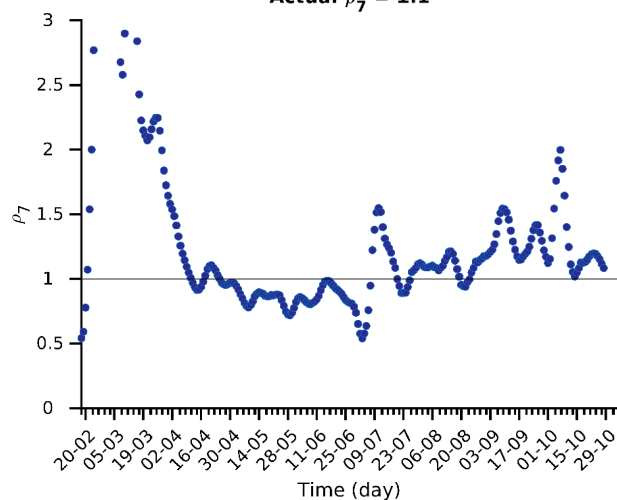
A ₁₄	EPG	CFR
430	466	1.83 %



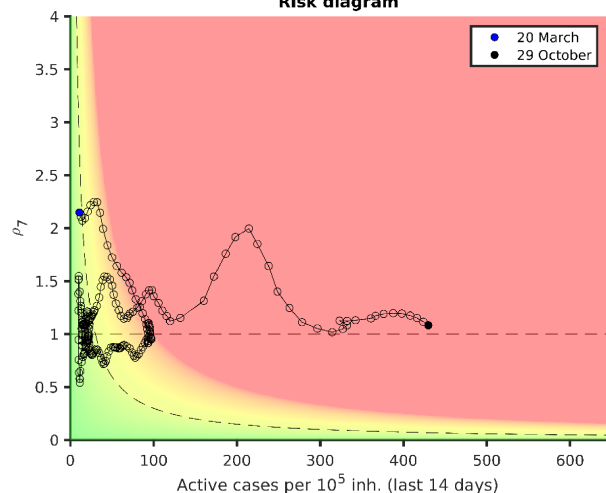
BIOCOM-Cov2 Degree = 9



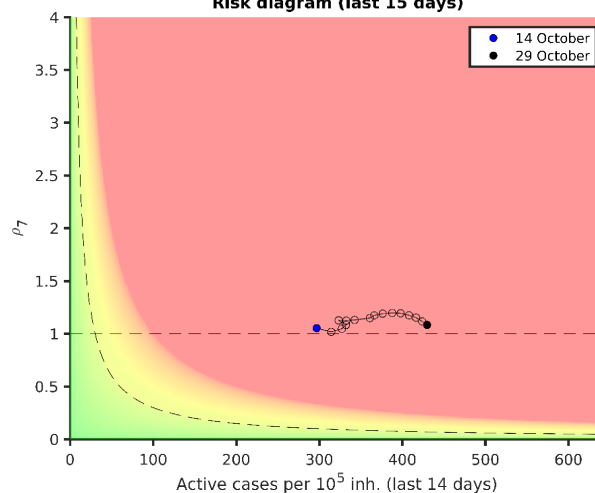
Actual $\rho_7 = 1.1$



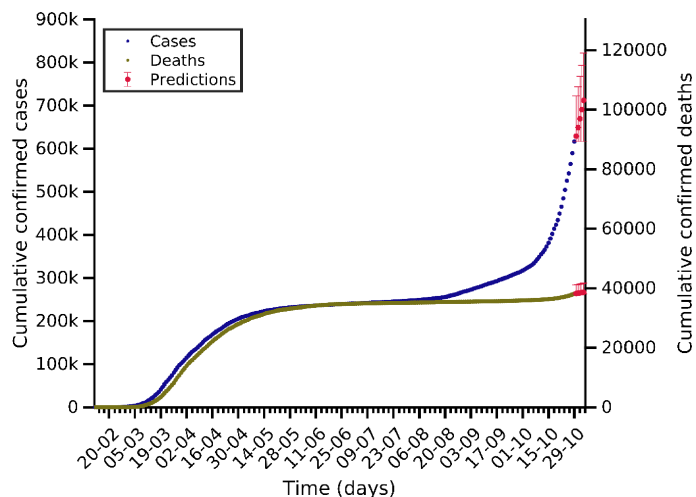
Risk diagram



Risk diagram (last 15 days)



Italy 29-10-2020. Pop: 60.5M. Cumulative incidence: 1020/10⁵

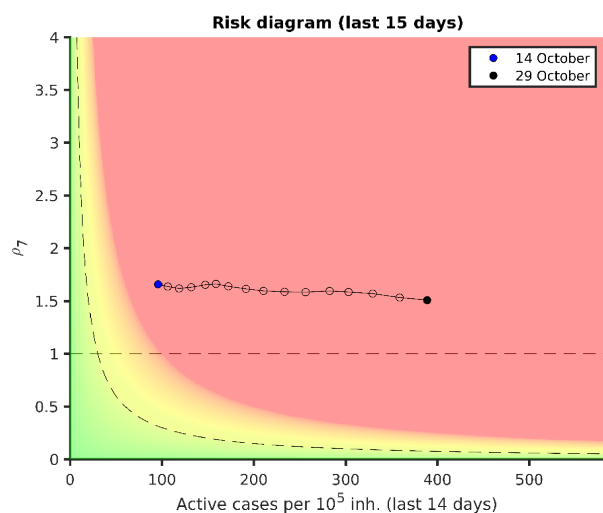
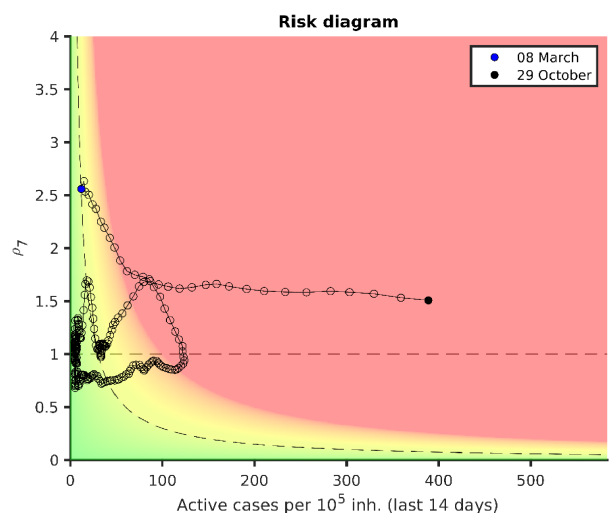
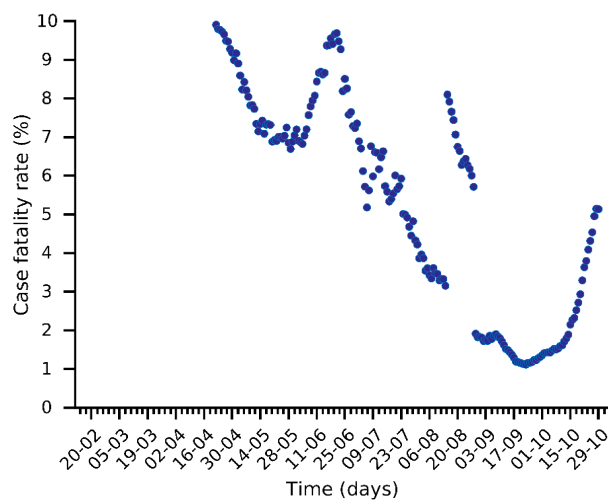
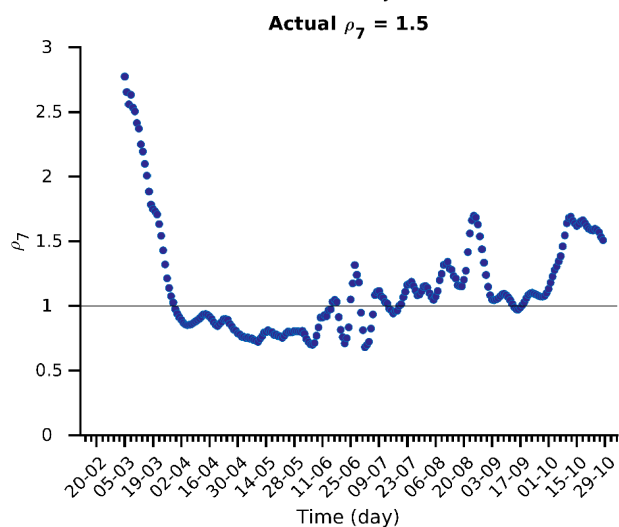
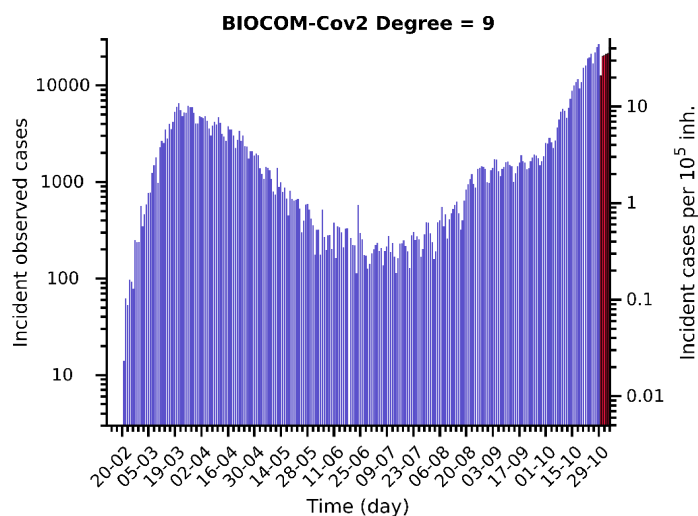
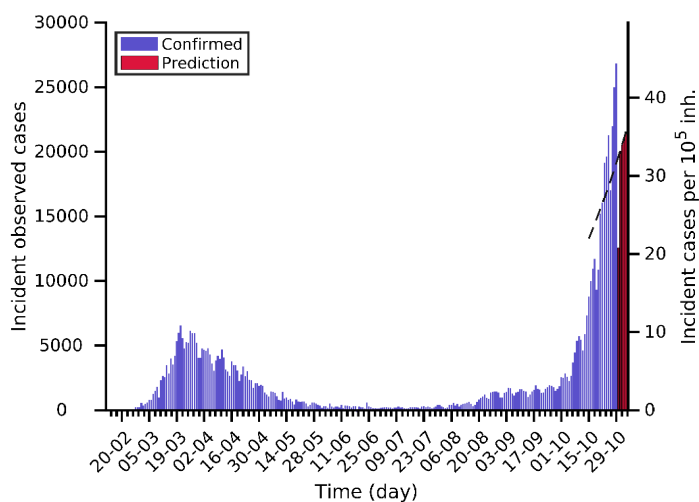


Predictions for next days

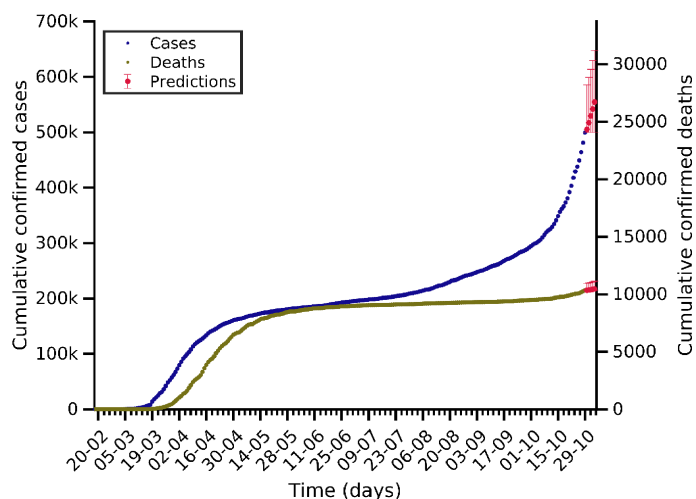
Day	Number of cases	95% Confidence Interval
30-10-2020	629157 (+12562)	[616595 - 722414]
01-11-2020	669744 (+20534)	[616595 - 767827]
03-11-2020	712285 (+21518)	[616595 - 821842]

Current indicators

A ₁₄	EPG	CFR
389	586	5.14 %



Germany 29-10-2020. Pop: 83.8M. Cumulative incidence: 596/10⁵

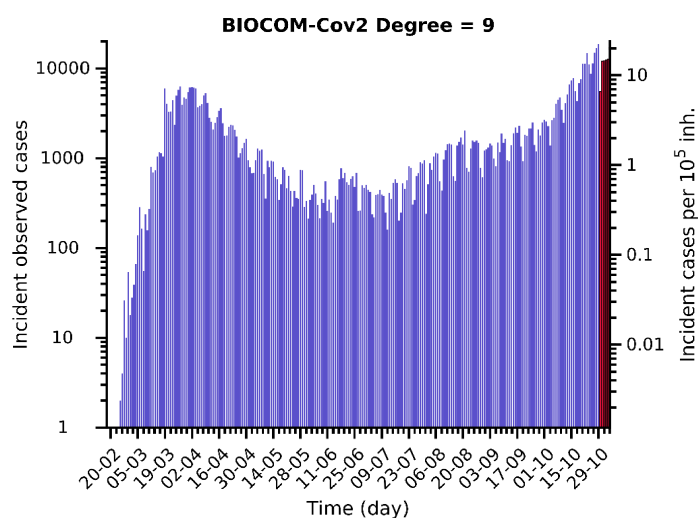
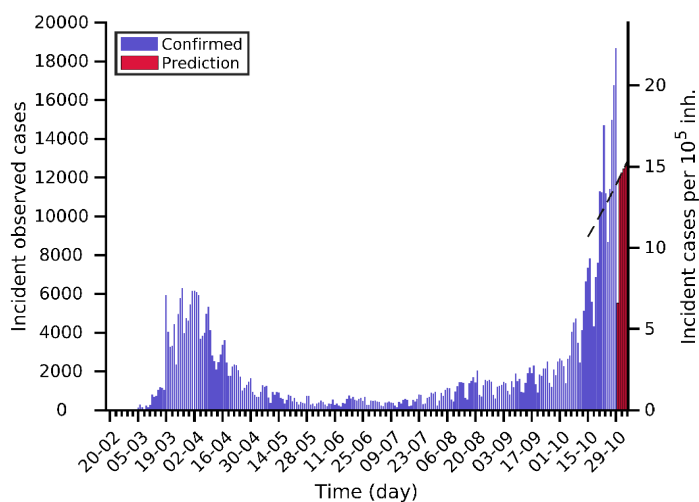


Predictions for next days

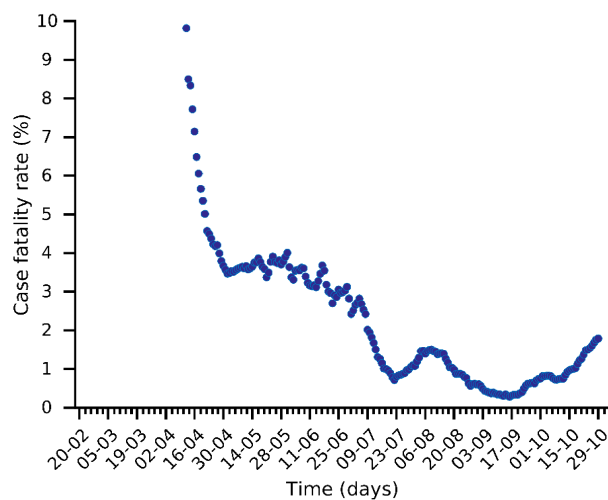
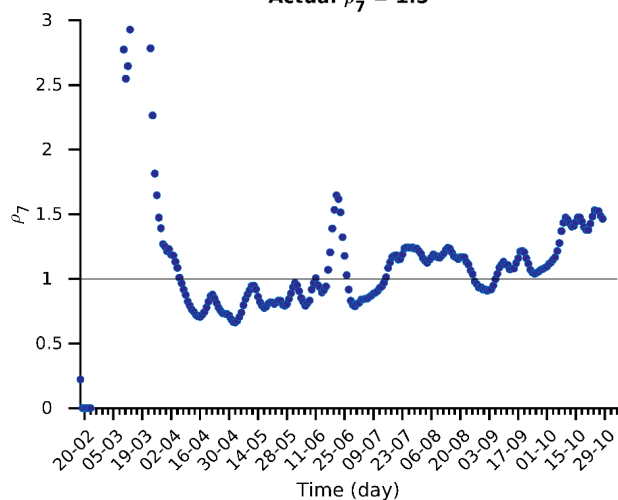
Day	Number of cases	95% Confidence Interval
30-10-2020	505225 (+5531)	[499694 - 585492]
01-11-2020	529508 (+12247)	[499694 - 613626]
03-11-2020	554639 (+12672)	[499694 - 647654]

Current indicators

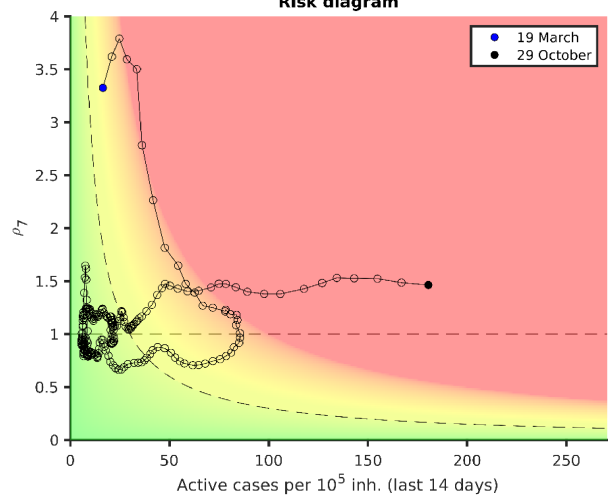
A ₁₄	EPG	CFR
180	264	1.79 %



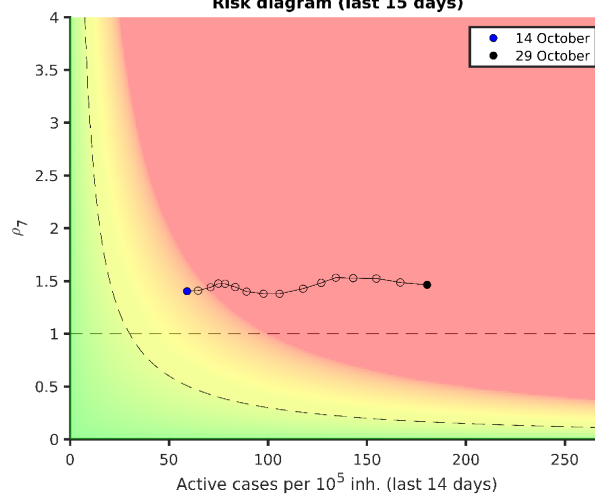
Actual $\rho_7 = 1.5$



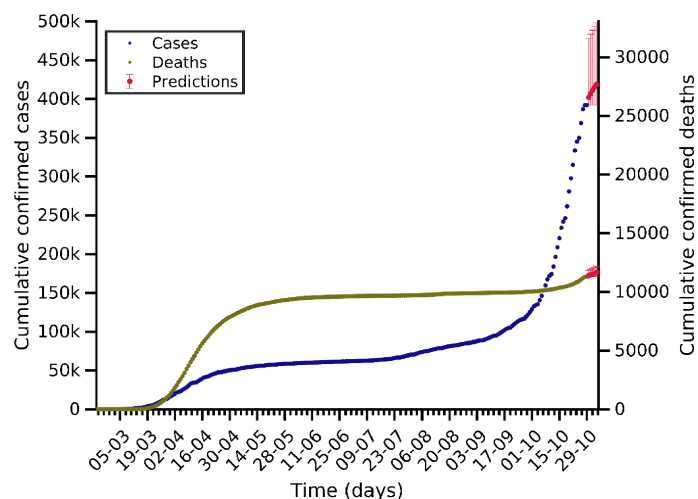
Risk diagram



Risk diagram (last 15 days)



Belgium 29-10-2020. Pop: 11.6M. Cumulative incidence: 3384/10⁵

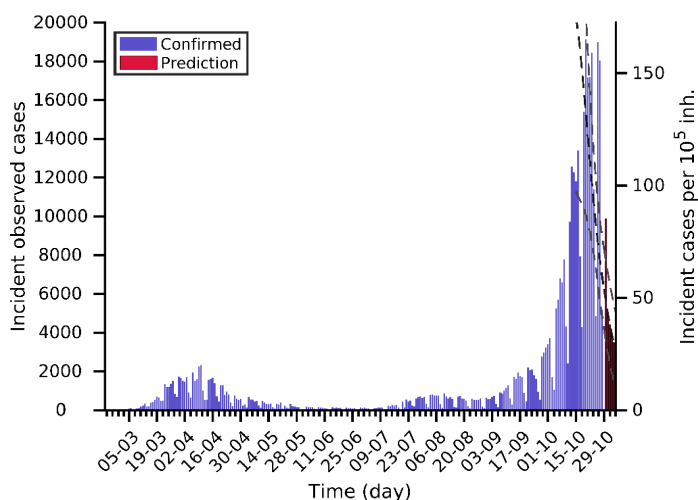


Predictions for next days

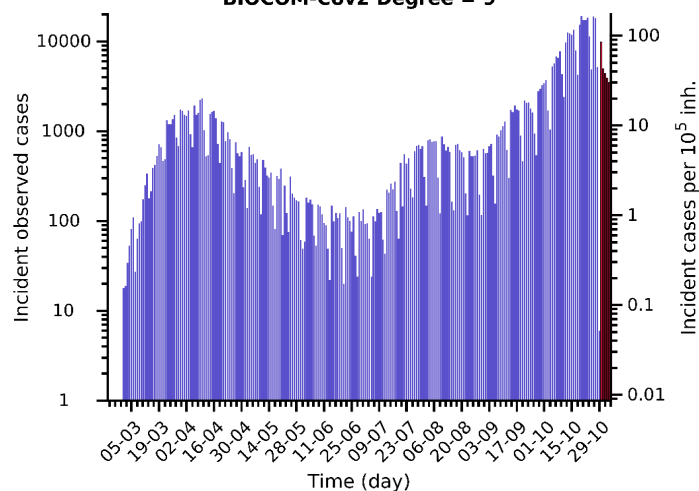
Day	Number of cases	95% Confidence Interval
30-10-2020	402035 (+9872)	[392163 - 477962]
01-11-2020	411410 (+4413)	[392163 - 488645]
03-11-2020	418804 (+3475)	[392163 - 497997]

Current indicators

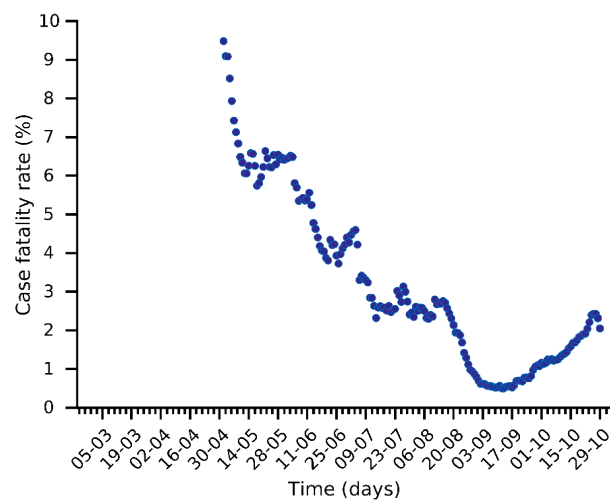
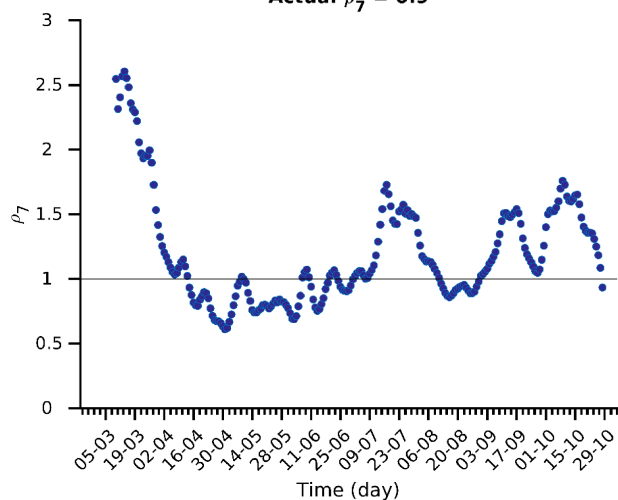
A ₁₄	EPG	CFR
1480	1381	2.05 %



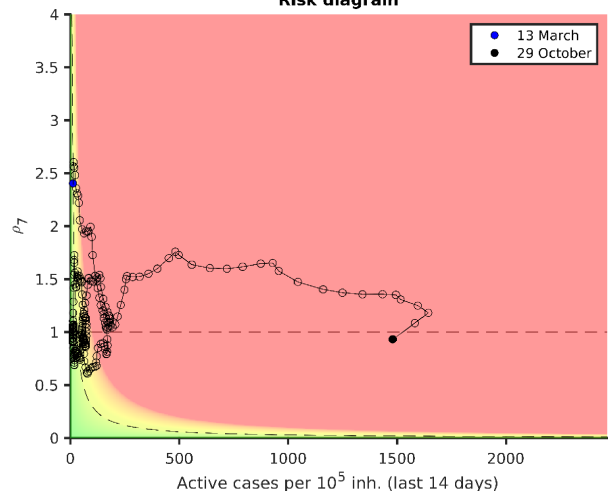
BIOCOM-Cov2 Degree = 9



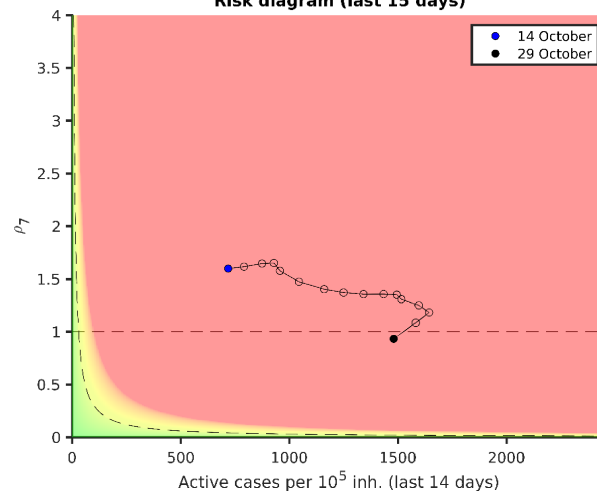
Actual $\rho_7 = 0.9$



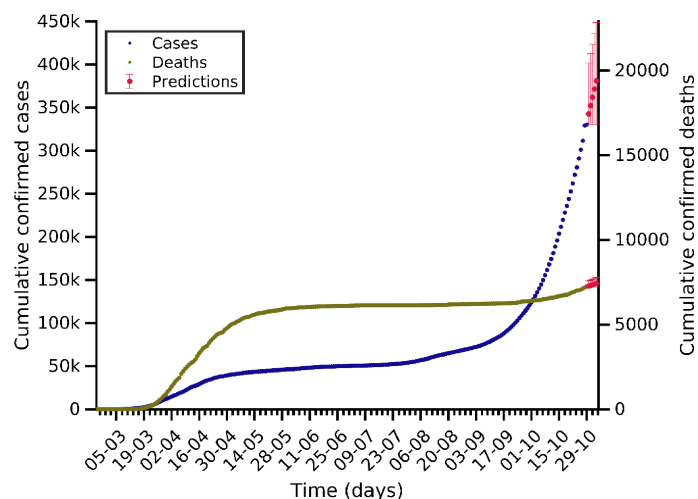
Risk diagram



Risk diagram (last 15 days)



Netherlands 29-10-2020. Pop: 17.1M. Cumulative incidence: 1927/10⁵

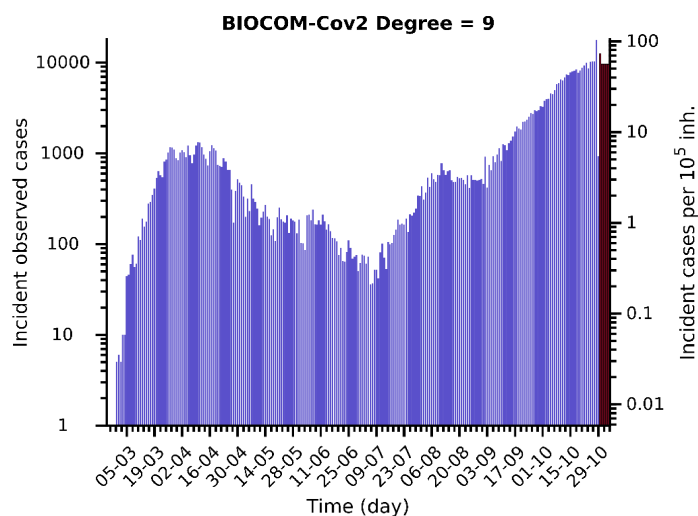
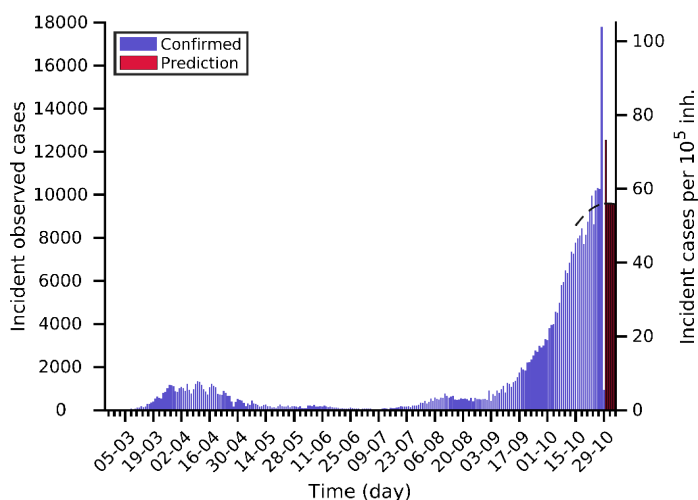


Predictions for next days

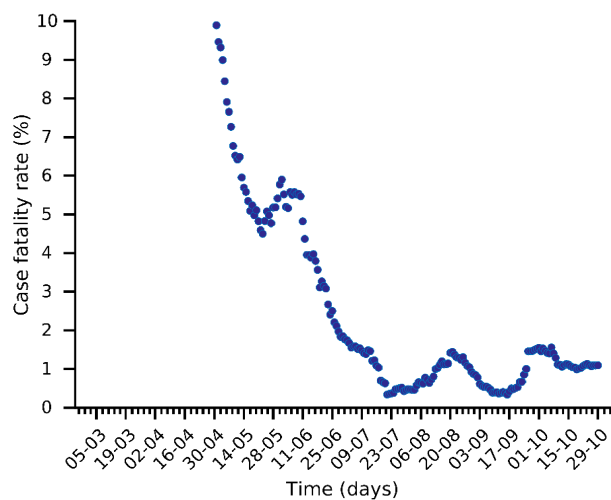
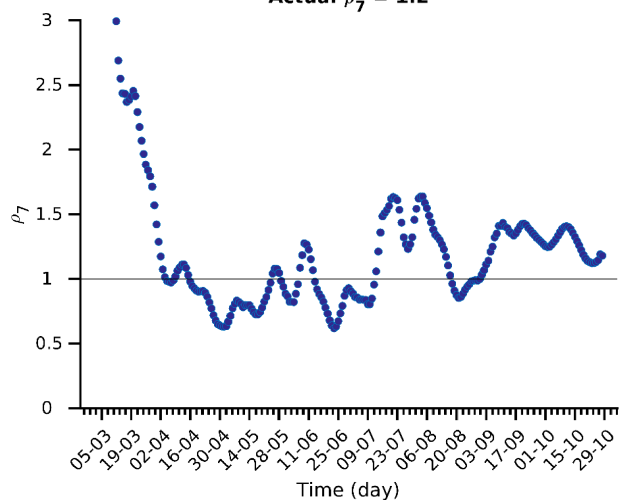
Day	Number of cases	95% Confidence Interval
30-10-2020	342808 (+12553)	[330255 - 402003]
01-11-2020	362012 (+9600)	[330255 - 423790]
03-11-2020	381174 (+9572)	[330255 - 448626]

Current indicators

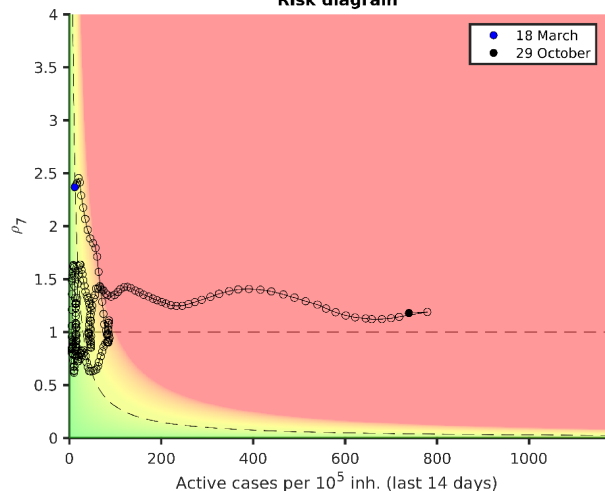
A ₁₄	EPG	CFR
739	871	1.09 %



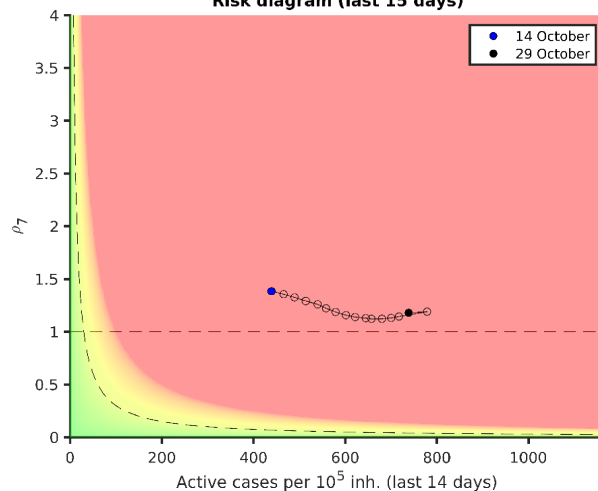
Actual $\rho_7 = 1.2$



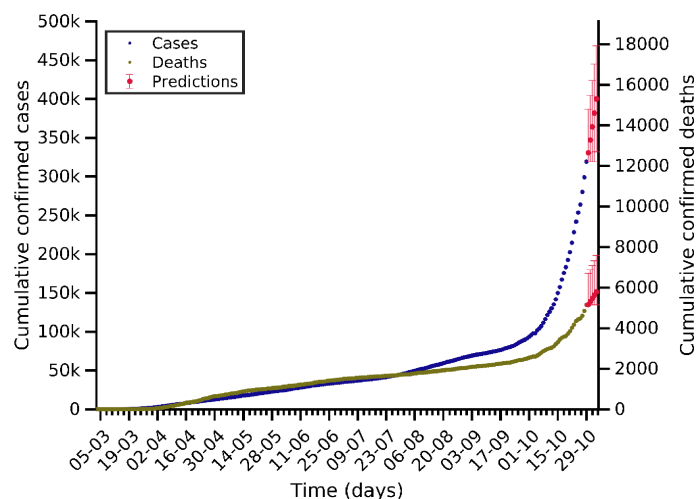
Risk diagram



Risk diagram (last 15 days)



Poland 29-10-2020. Pop: 37.8M. Cumulative incidence: 843/10⁵

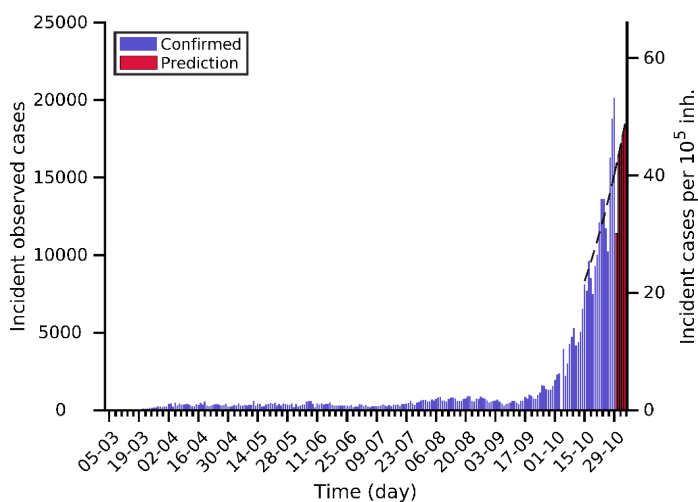


Predictions for next days

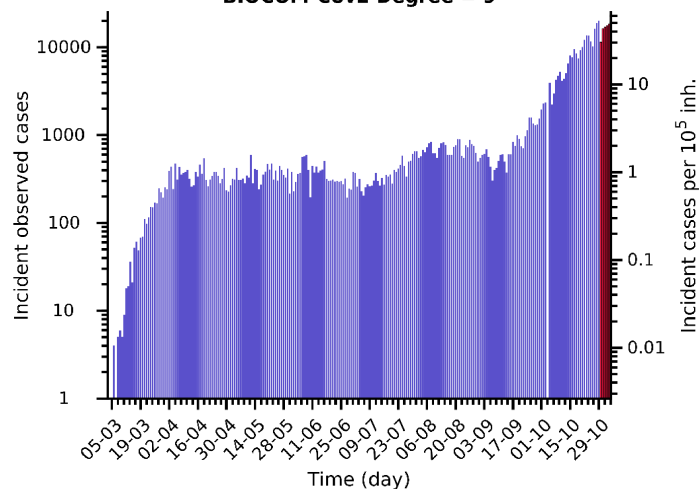
Day	Number of cases	95% Confidence Interval
30-10-2020	330607 (+11402)	[319205 - 386910]
01-11-2020	364108 (+17068)	[319205 - 423831]
03-11-2020	400215 (+18387)	[331870 - 468560]

Current indicators

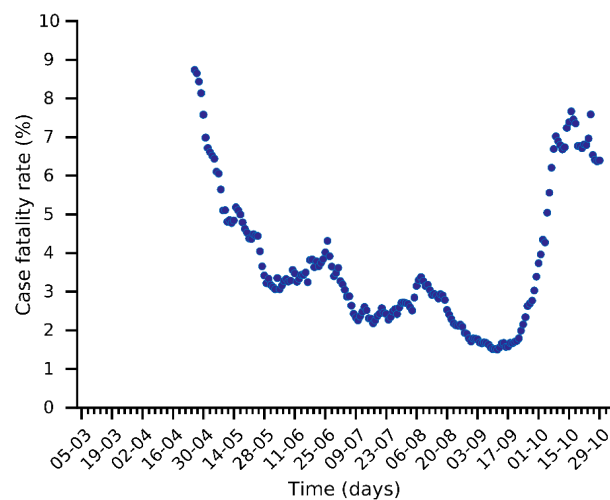
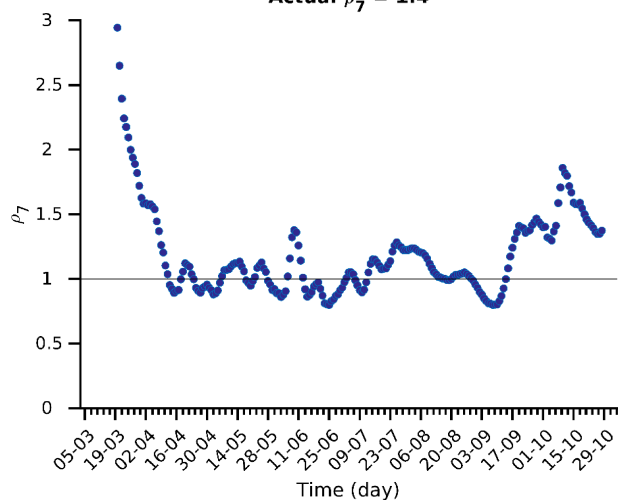
A ₁₄	EPG	CFR
447	614	6.39 %



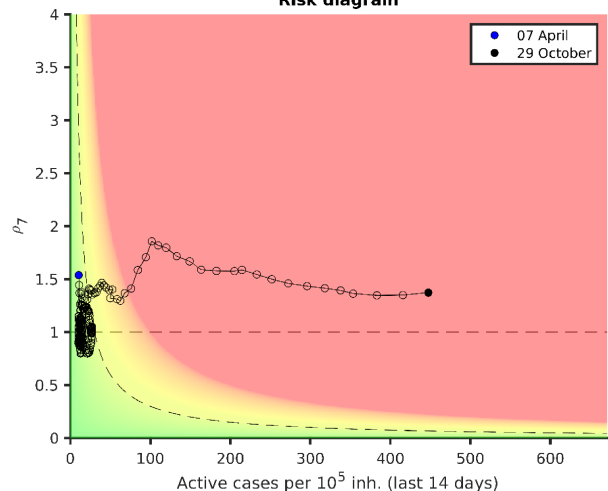
BIOCOM-Cov2 Degree = 9



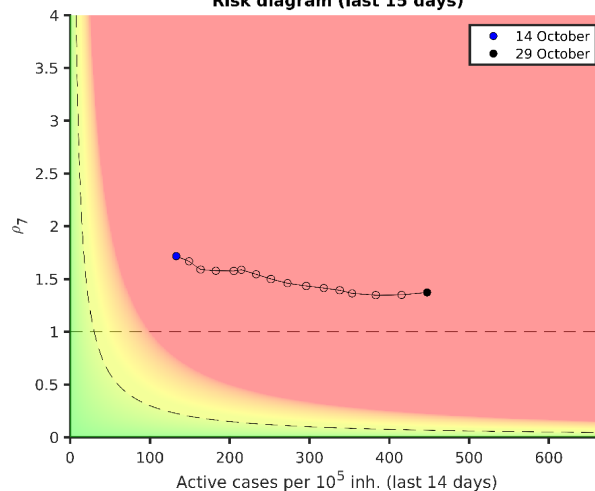
Actual $\rho_7 = 1.4$



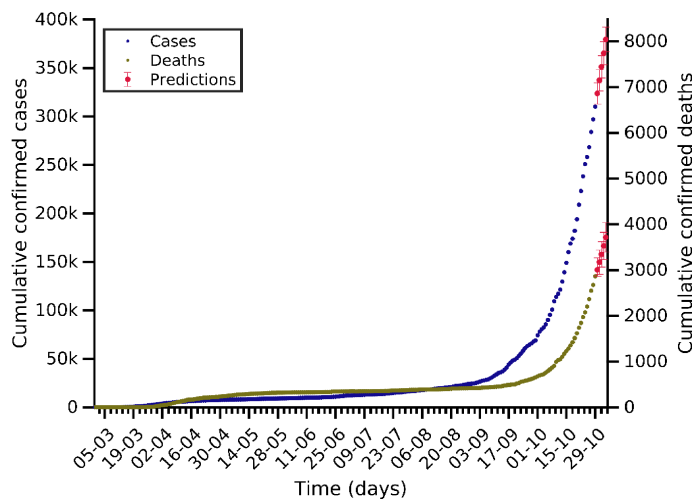
Risk diagram



Risk diagram (last 15 days)



Czech Rep 29-10-2020. Pop: 10.7M. Cumulative incidence: 2895/10⁵

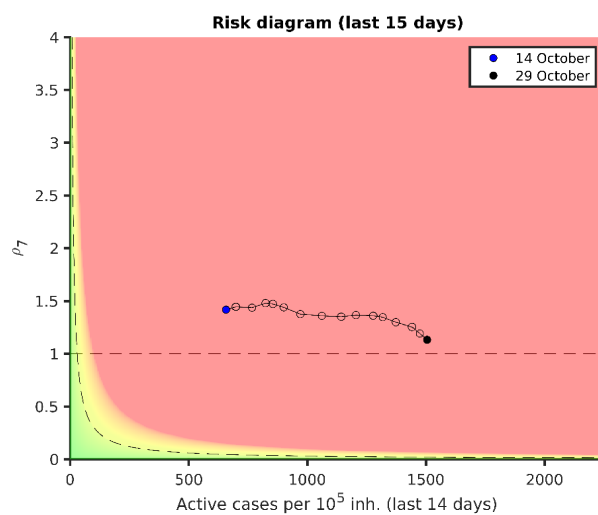
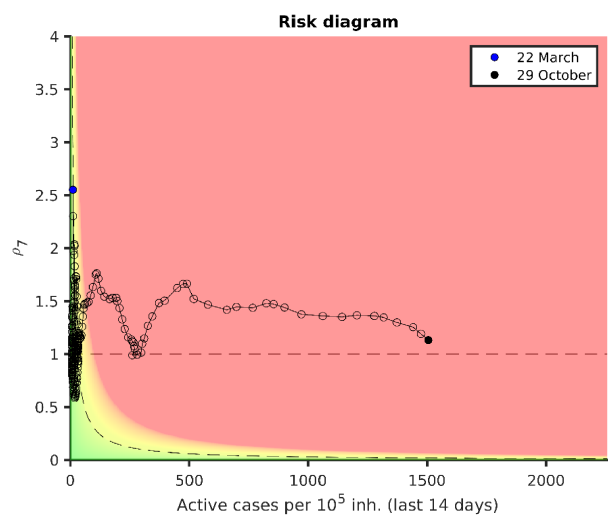
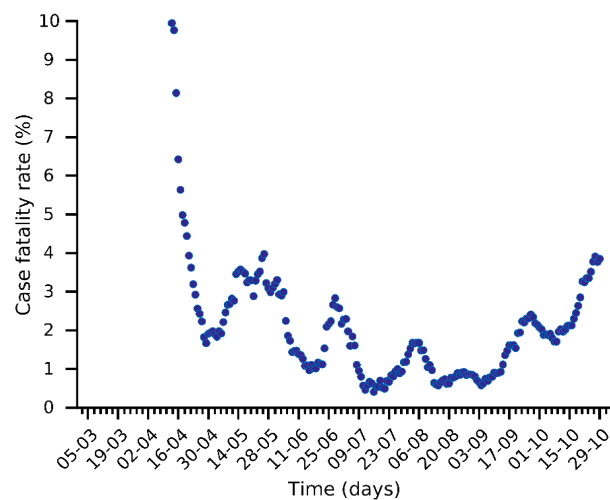
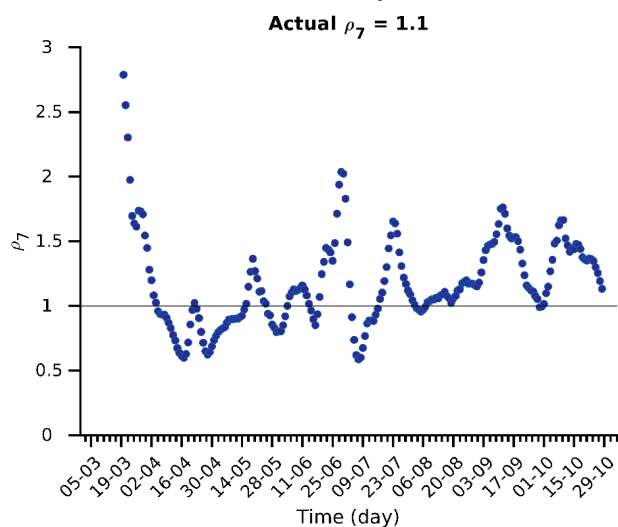
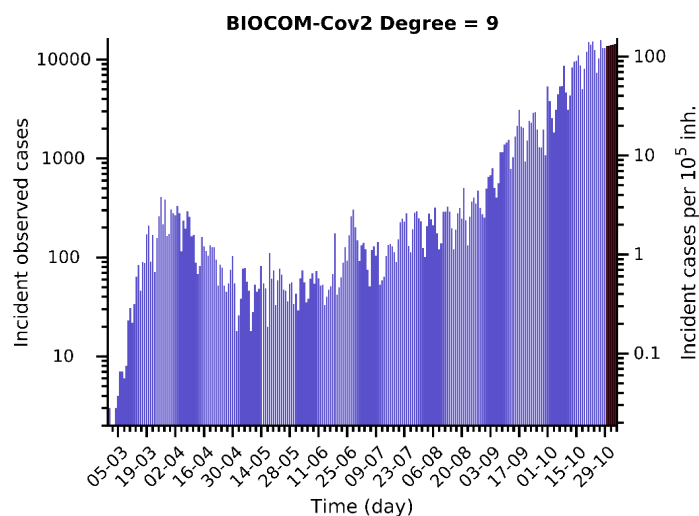
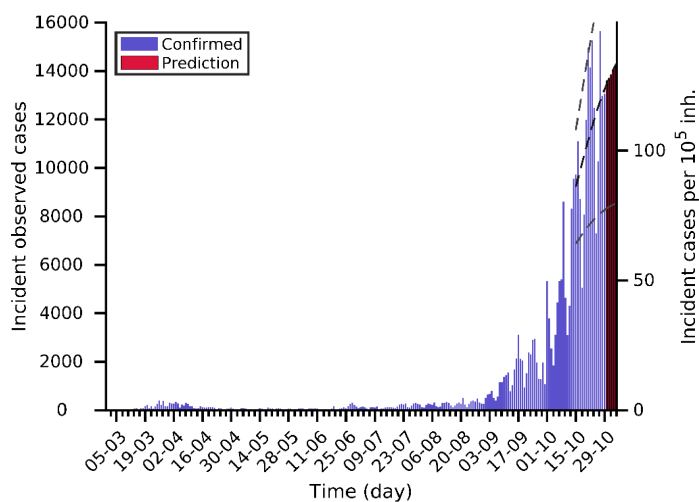


Predictions for next days

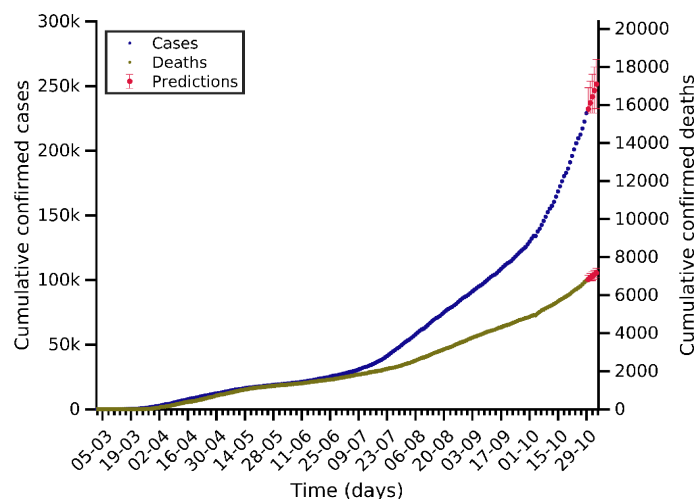
Day	Number of cases	95% Confidence Interval
30-10-2020	323659 (+13591)	[312754 - 334564]
01-11-2020	351175 (+13852)	[339713 - 362637]
03-11-2020	379394 (+14191)	[366638 - 392150]

Current indicators

A ₁₄	EPG	CFR
1504	1703	3.85 %



Romania 29-10-2020. Pop: 19.2M. Cumulative incidence: 1191/10⁵

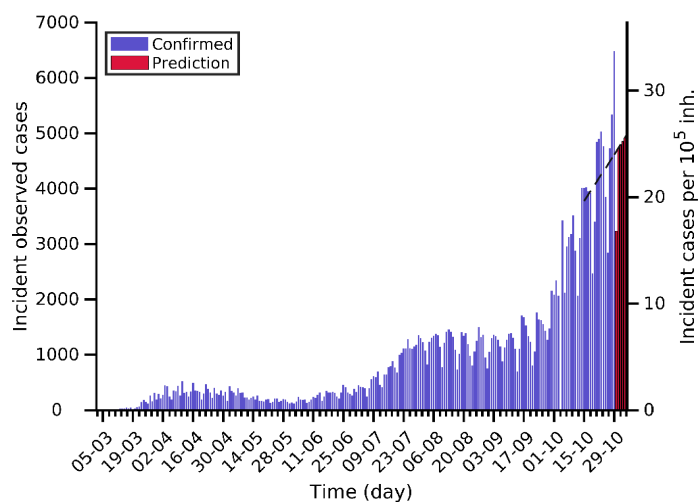


Predictions for next days

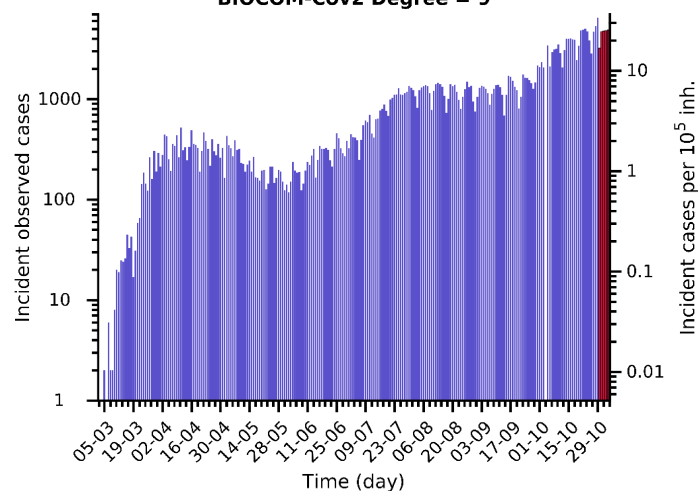
Day	Number of cases	95% Confidence Interval
30-10-2020	232271 (+3231)	[229040 - 248866]
01-11-2020	241800 (+4795)	[229040 - 259156]
03-11-2020	251573 (+4917)	[232488 - 270658]

Current indicators

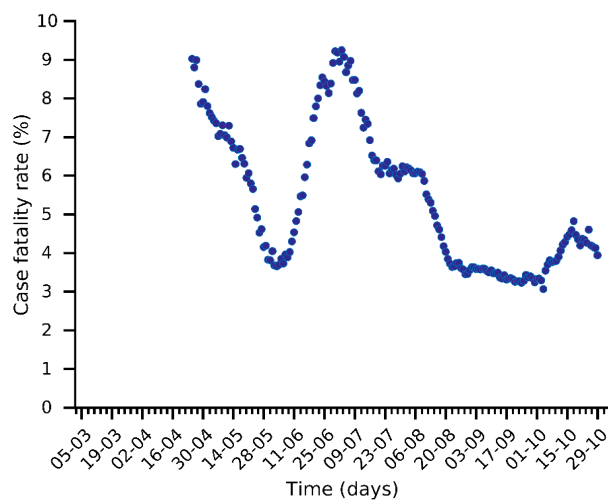
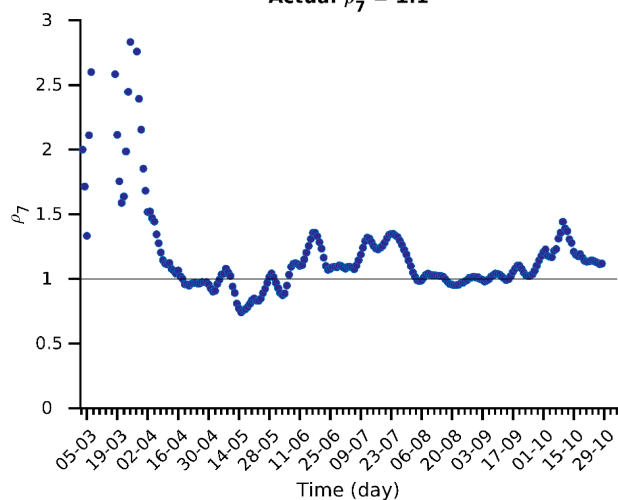
A ₁₄	EPG	CFR
315	352	3.94 %



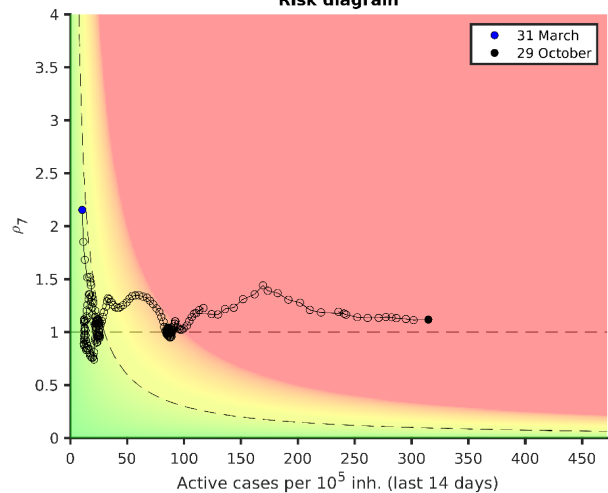
BIOCOM-Cov2 Degree = 9



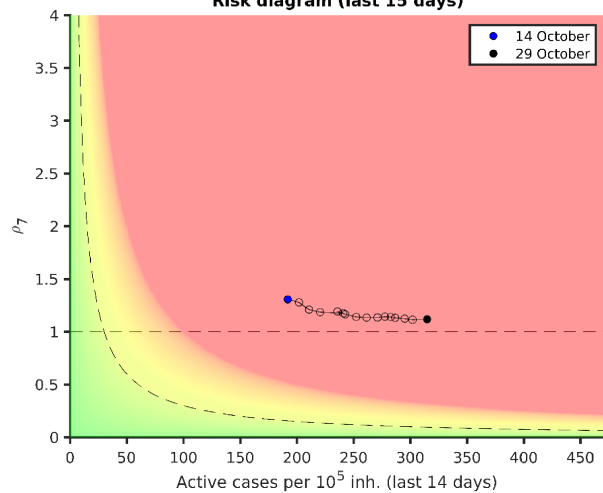
Actual $\rho_7 = 1.1$



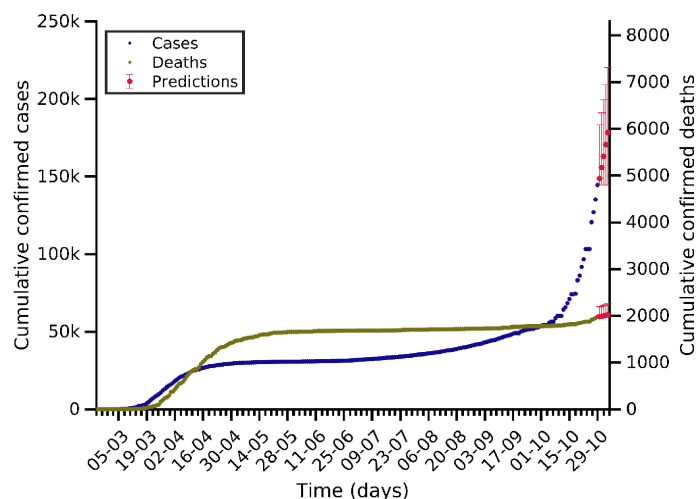
Risk diagram



Risk diagram (last 15 days)



Switzerland 29-10-2020. Pop: 8.7M. Cumulative incidence: 1670/10⁵

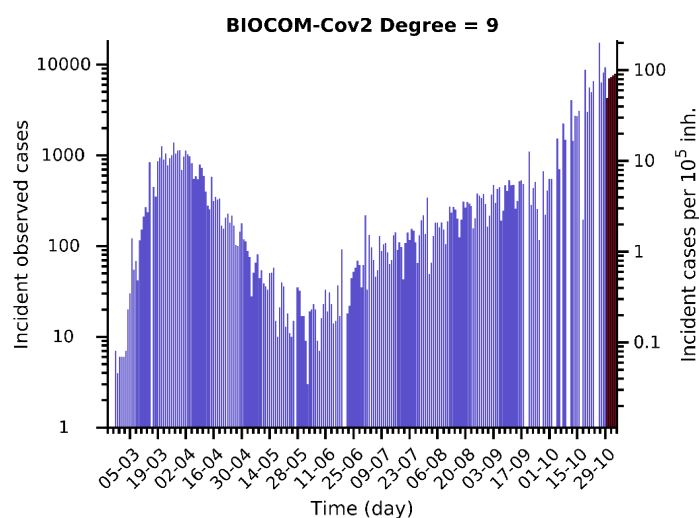
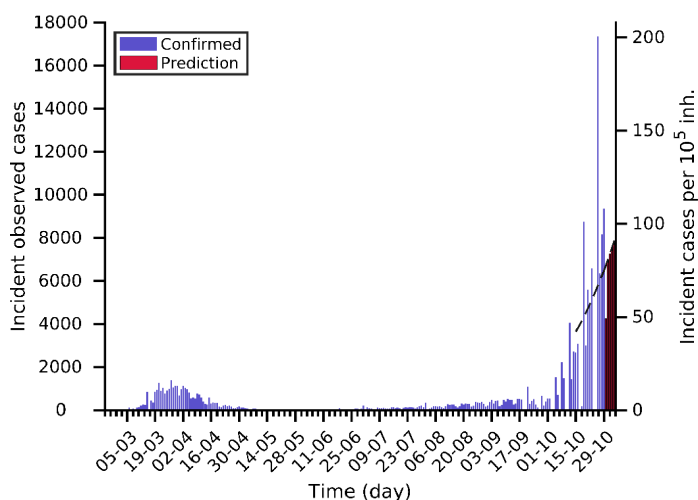


Predictions for next days

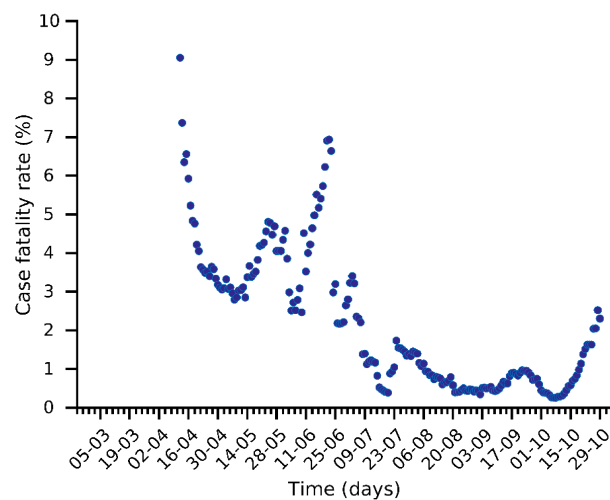
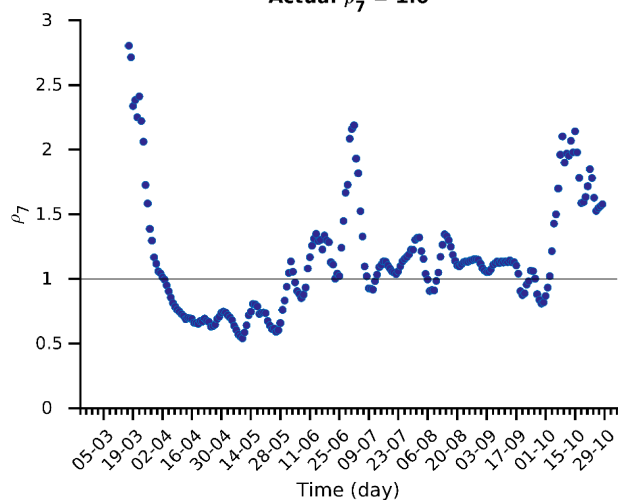
Day	Number of cases	95% Confidence Interval
30-10-2020	148814 (+4256)	[144558 - 183337]
01-11-2020	163061 (+7256)	[144558 - 199649]
03-11-2020	178395 (+7806)	[144558 - 220162]

Current indicators

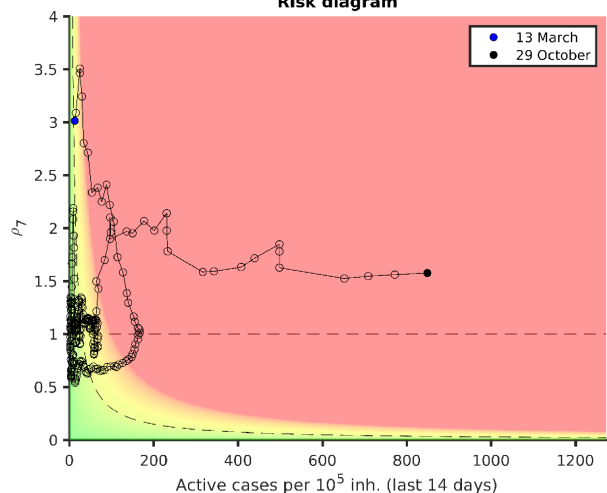
A ₁₄	EPG	CFR
848	1338	2.30 %



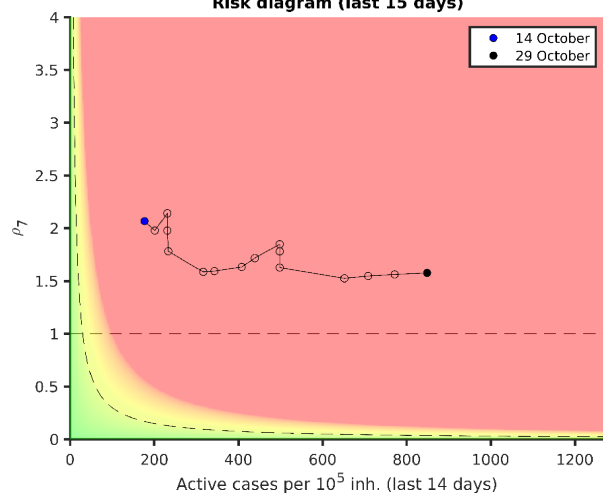
Actual $\rho_7 = 1.6$



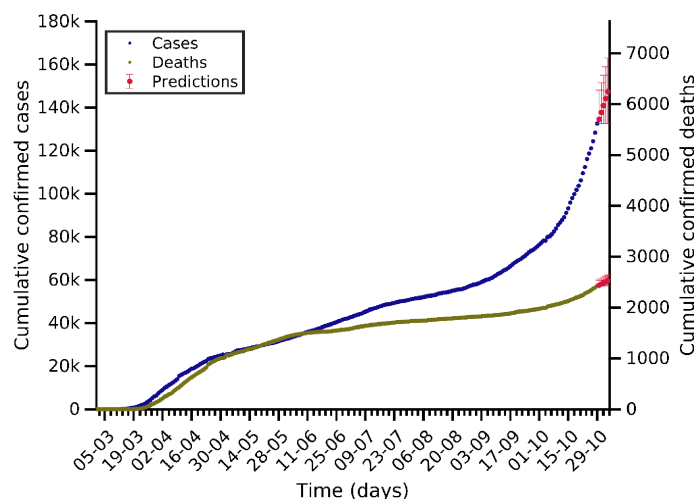
Risk diagram



Risk diagram (last 15 days)



Portugal 29-10-2020. Pop: 10.2M. Cumulative incidence: 1301/10⁵

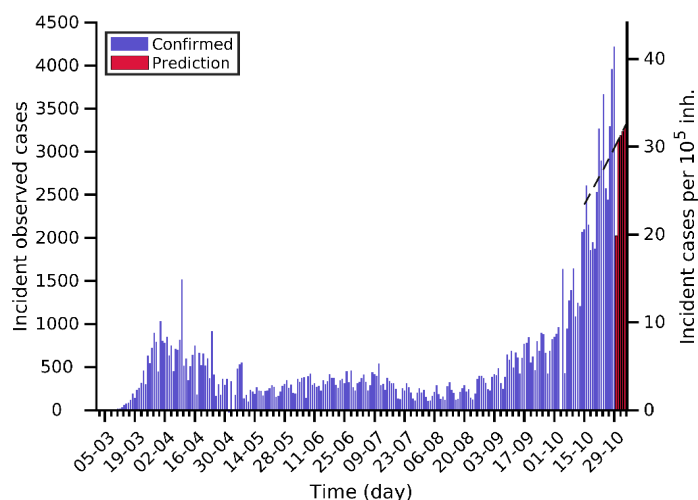


Predictions for next days

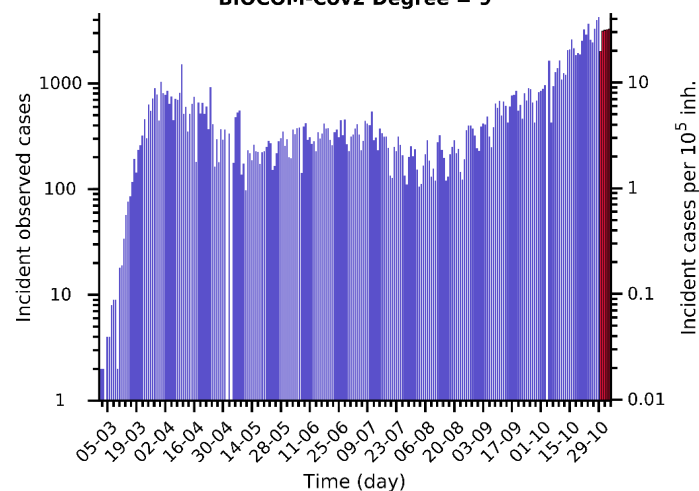
Day	Number of cases	95% Confidence Interval
30-10-2020	134638 (+2022)	[132616 - 148134]
01-11-2020	140965 (+3188)	[132616 - 155100]
03-11-2020	147490 (+3287)	[132616 - 163093]

Current indicators

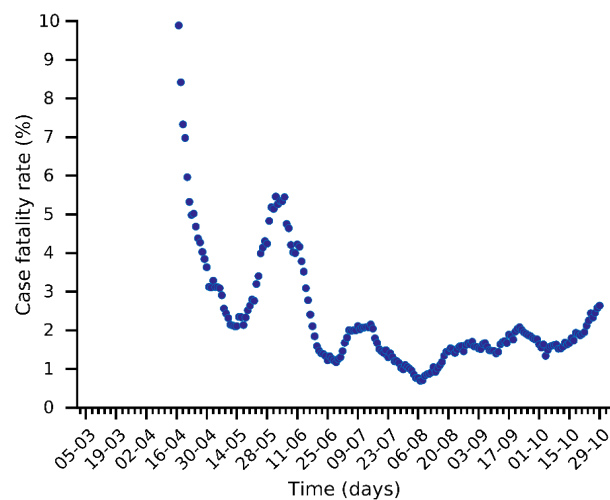
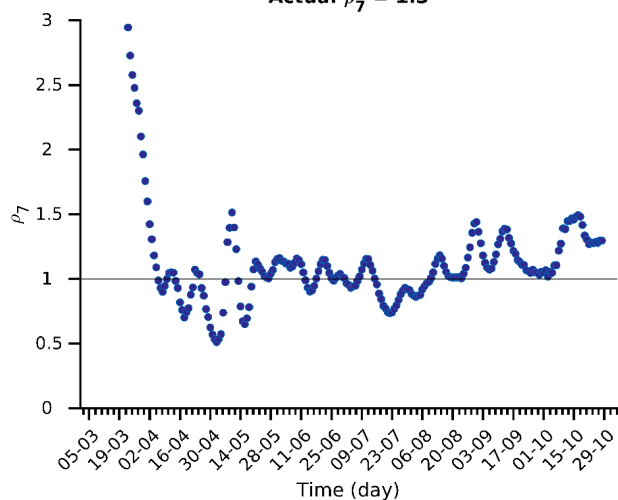
A ₁₄	EPG	CFR
386	500	2.64 %



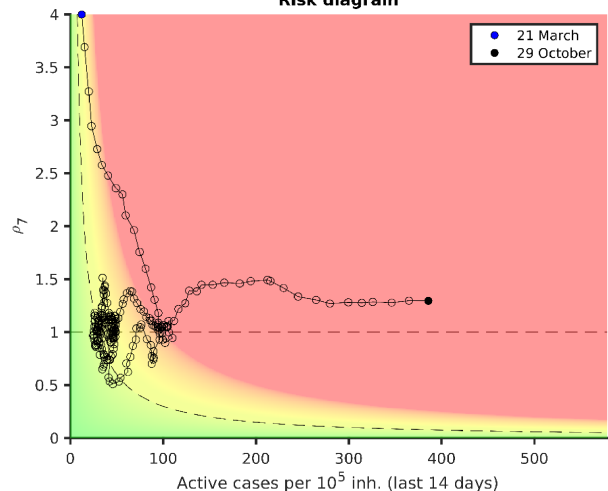
BIOCOM-Cov2 Degree = 9



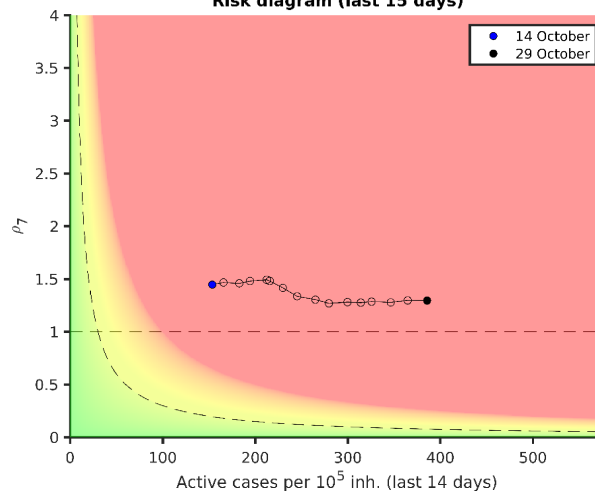
Actual $\rho_7 = 1.3$



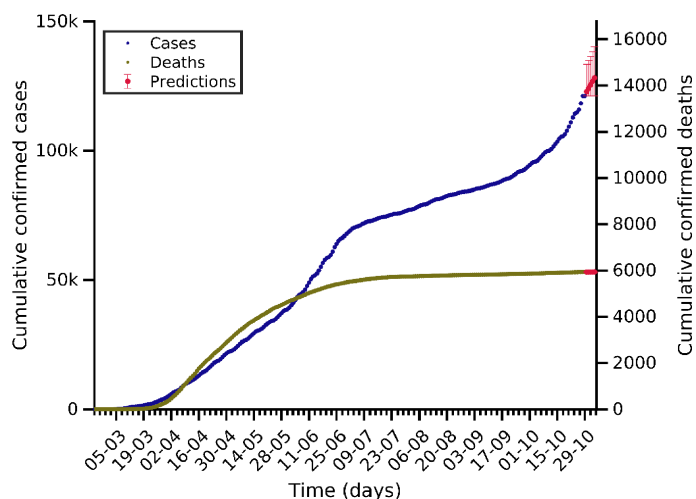
Risk diagram



Risk diagram (last 15 days)



Sweden 29-10-2020. Pop: 10.1M. Cumulative incidence: 1200/10⁵

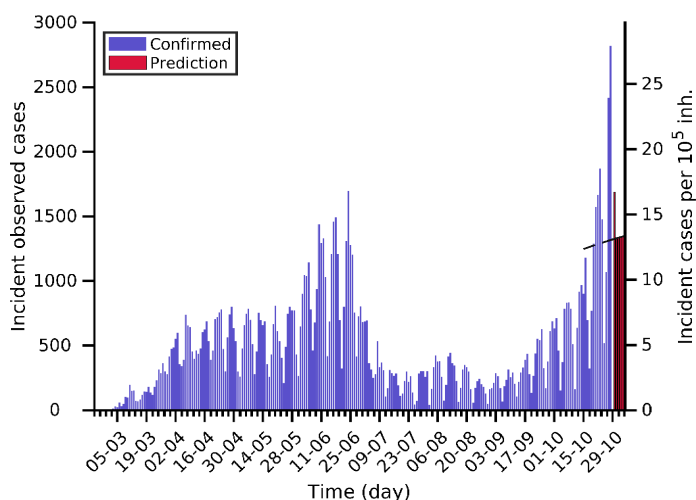


Predictions for next days

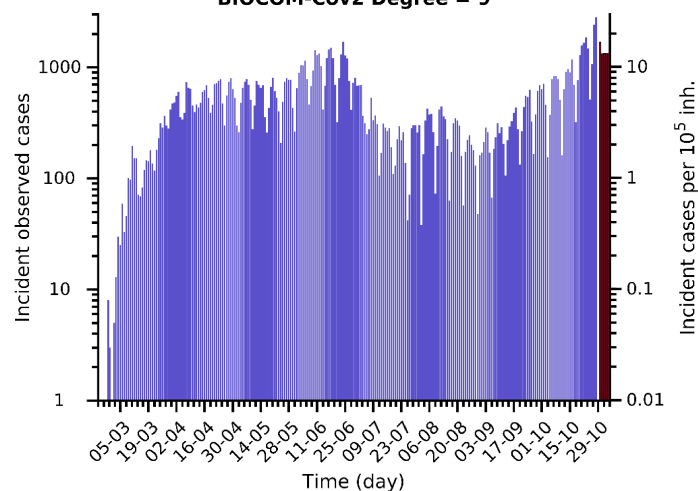
Day	Number of cases	95% Confidence Interval
30-10-2020	122855 (+1688)	[121167 - 133446]
01-11-2020	125520 (+1335)	[121167 - 136549]
03-11-2020	128204 (+1344)	[121167 - 140185]

Current indicators

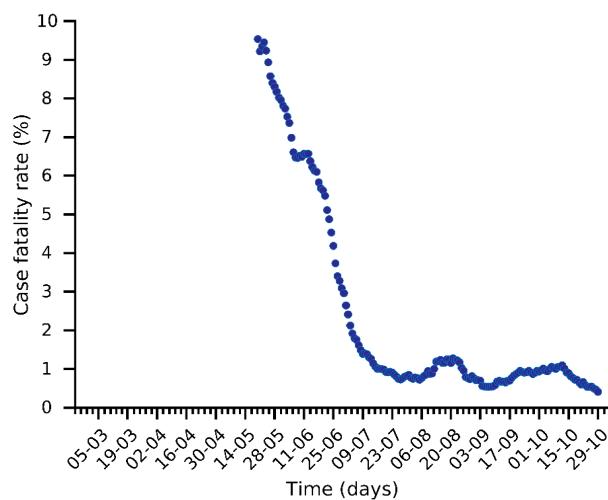
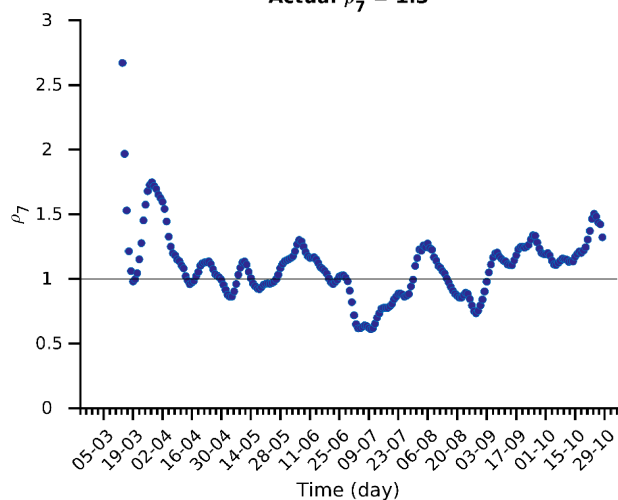
A ₁₄	EPG	CFR
175	231	0.41 %



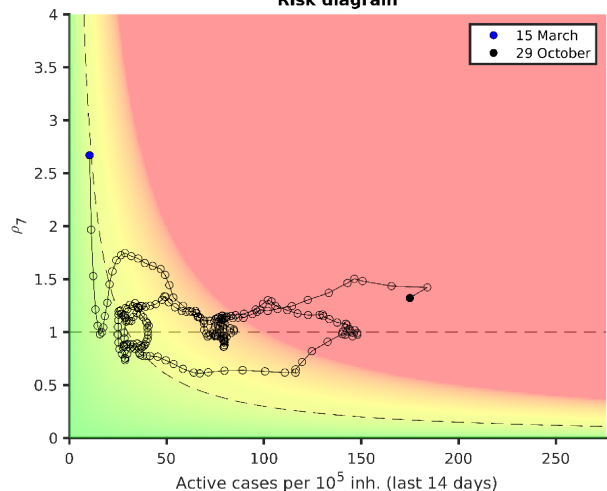
BIOCOM-Cov2 Degree = 9



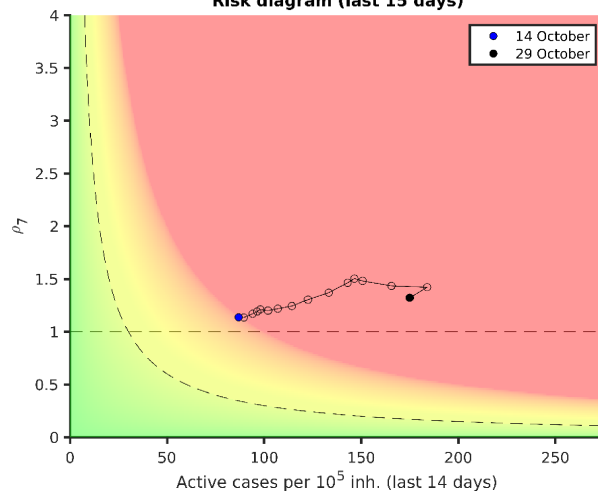
Actual $\rho_7 = 1.3$



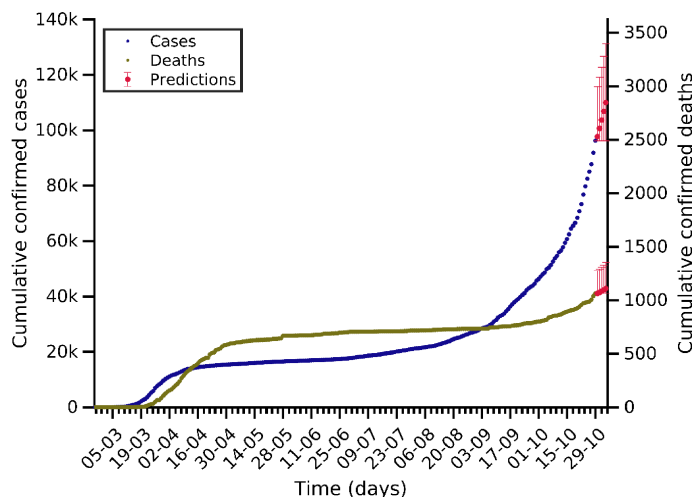
Risk diagram



Risk diagram (last 15 days)



Austria 29-10-2020. Pop: 9.0M. Cumulative incidence: 1068/10⁵

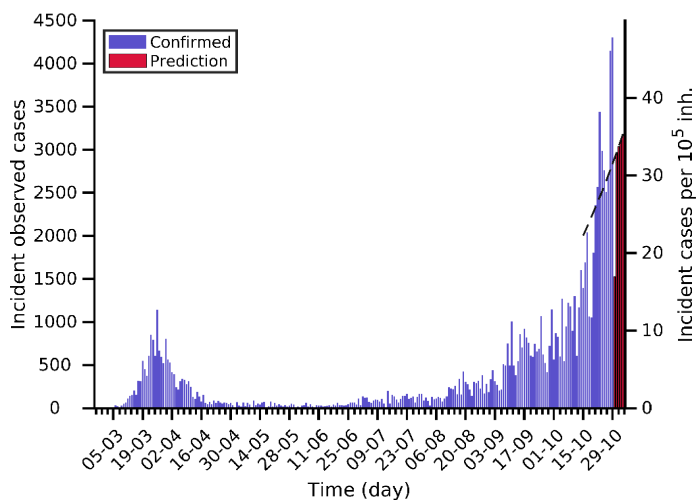


Predictions for next days

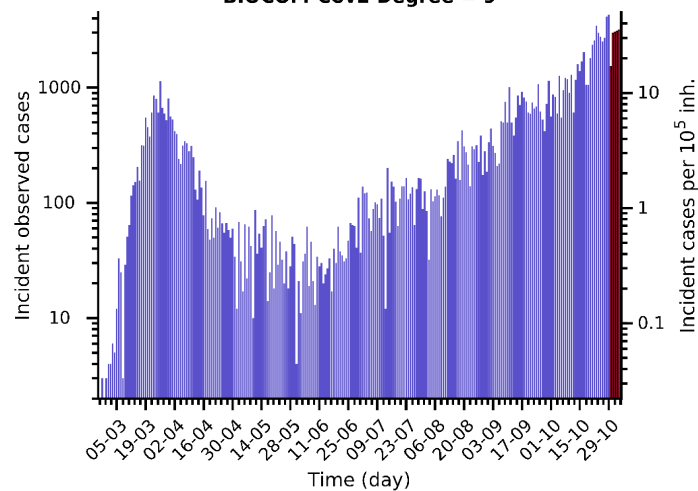
Day	Number of cases	95% Confidence Interval
30-10-2020	97724 (+1524)	[96200 - 115810]
01-11-2020	103730 (+3037)	[96200 - 122740]
03-11-2020	110012 (+3176)	[96200 - 131210]

Current indicators

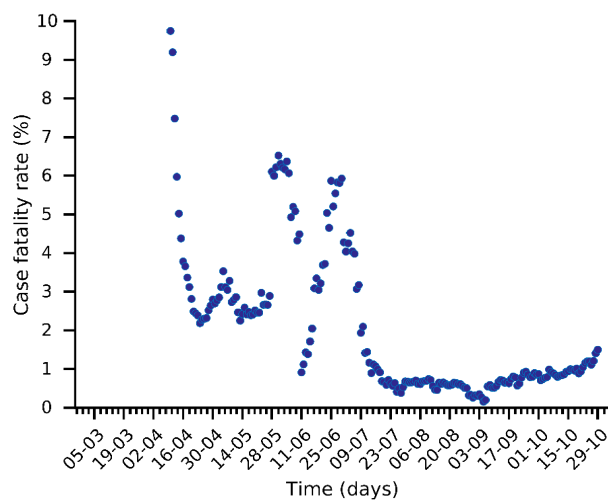
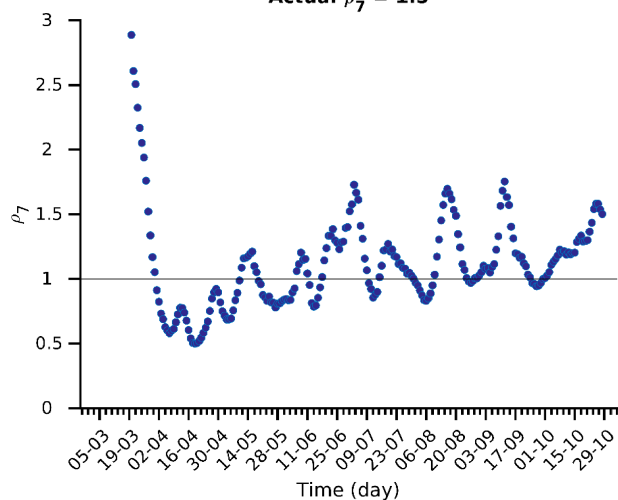
A ₁₄	EPG	CFR
393	591	1.50 %



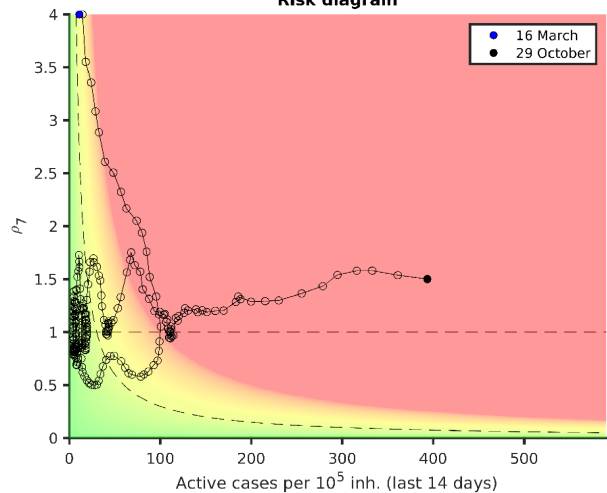
BIOCOM-Cov2 Degree = 9



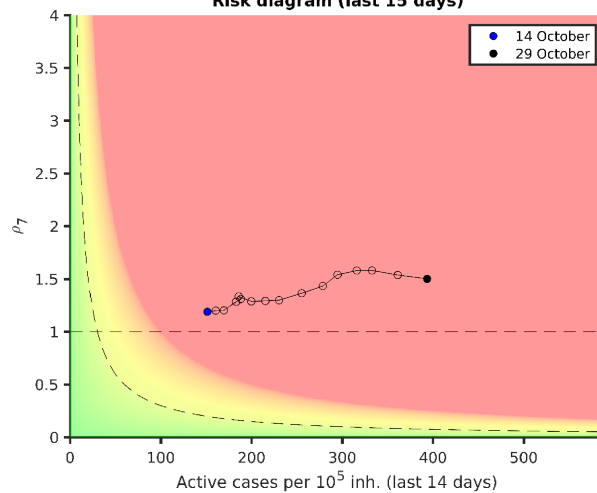
Actual $\rho_7 = 1.5$



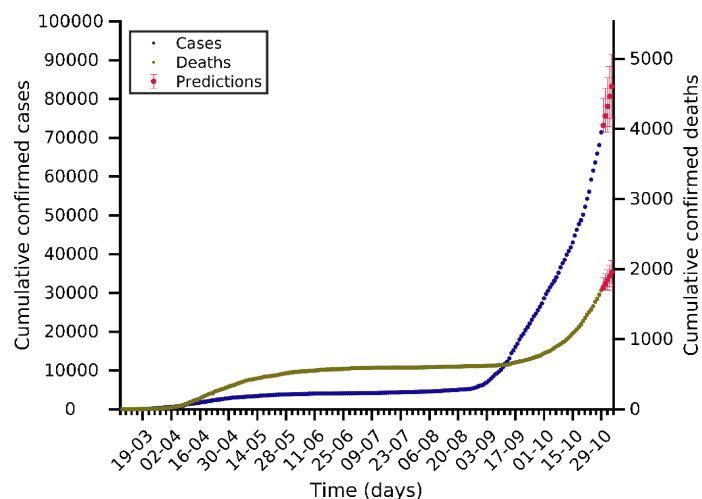
Risk diagram



Risk diagram (last 15 days)



Hungary 29-10-2020. Pop: 9.7M. Cumulative incidence: 739/10⁵

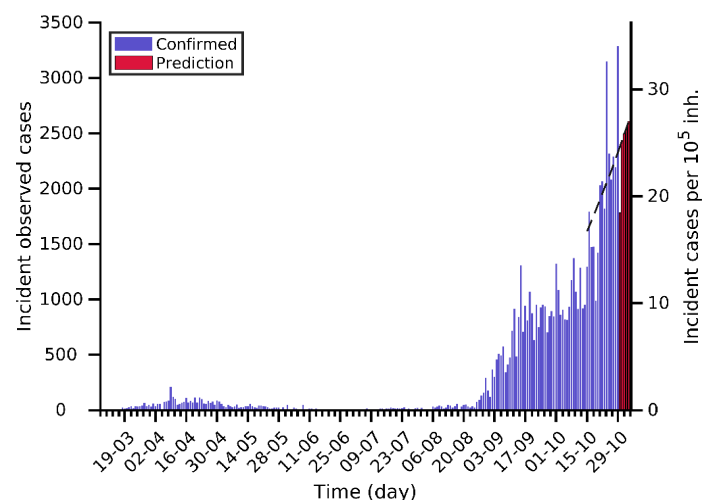


Predictions for next days

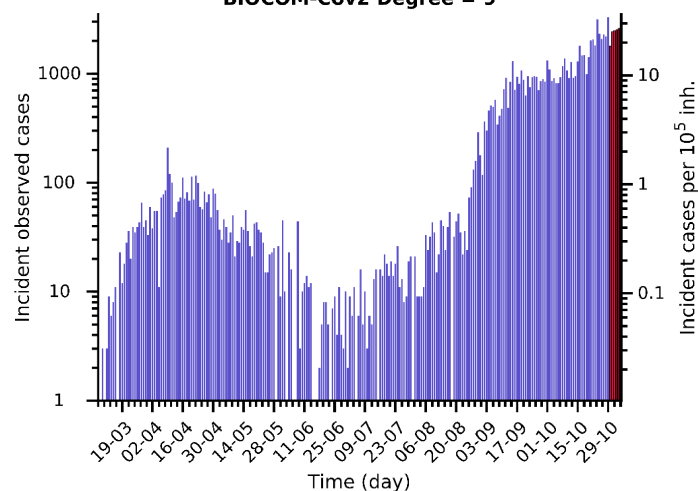
Day	Number of cases	95% Confidence Interval
30-10-2020	73196 (+1783)	[71413 - 80196]
01-11-2020	78126 (+2493)	[71413 - 85488]
03-11-2020	83284 (+2608)	[75062 - 91507]

Current indicators

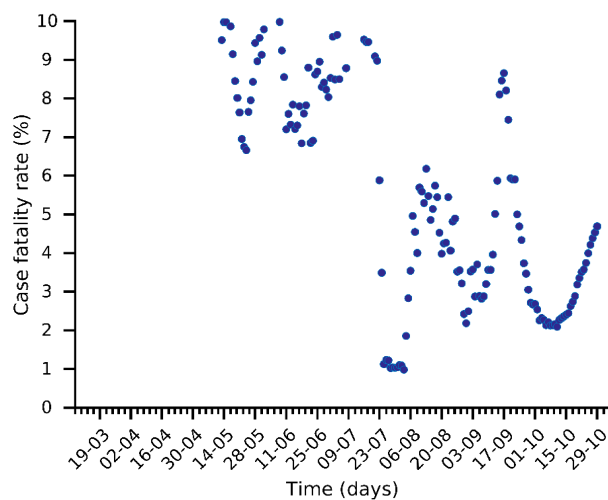
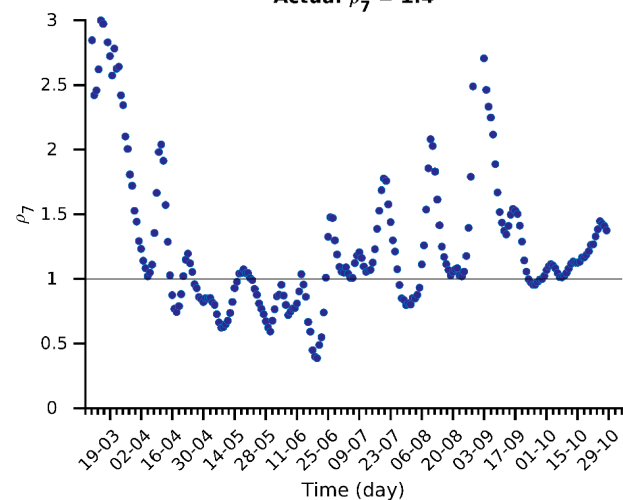
A ₁₄	EPG	CFR
294	404	4.69 %



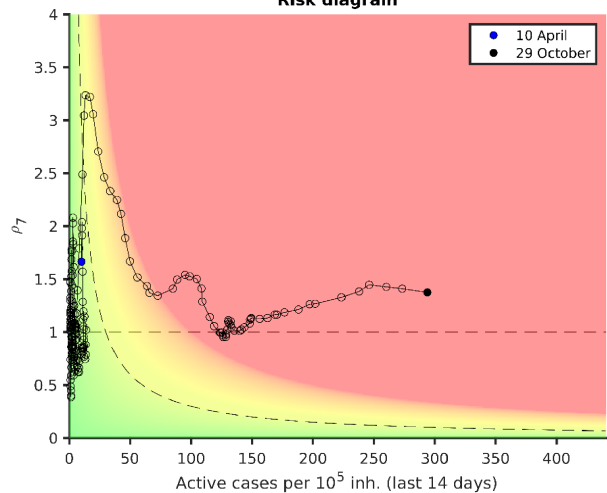
BIOCOM-Cov2 Degree = 9



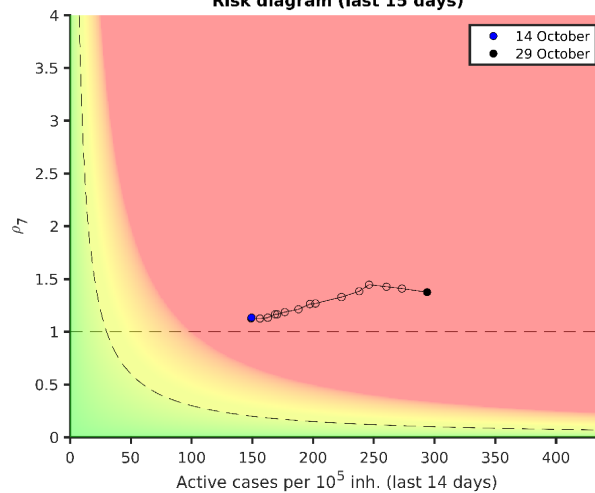
Actual $\rho_7 = 1.4$



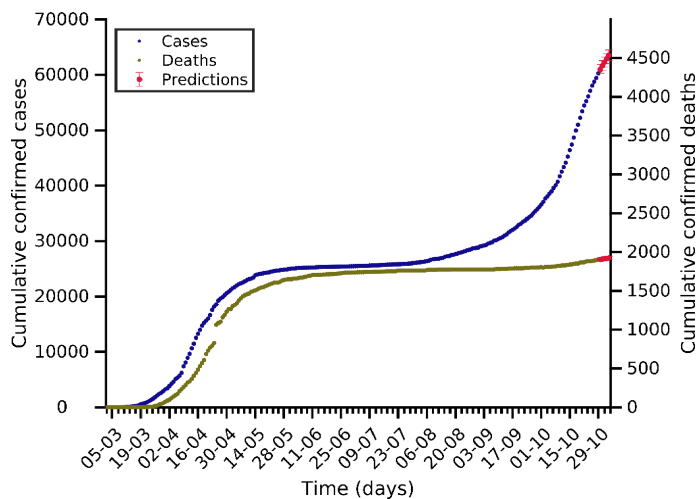
Risk diagram



Risk diagram (last 15 days)



Ireland 29-10-2020. Pop: 4.9M. Cumulative incidence: 1221/10⁵

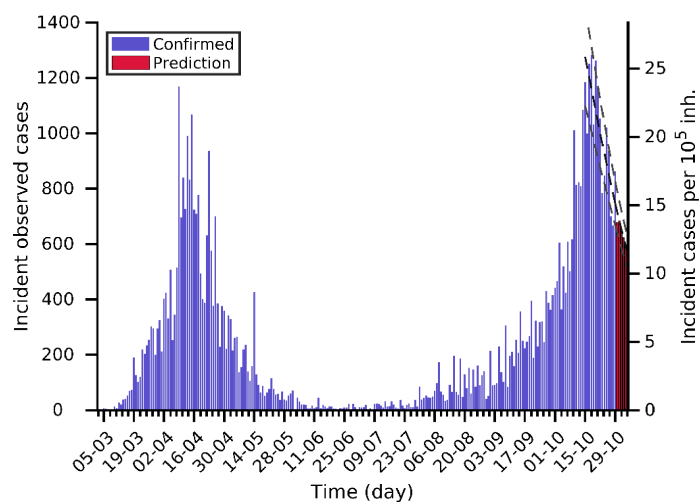


Predictions for next days

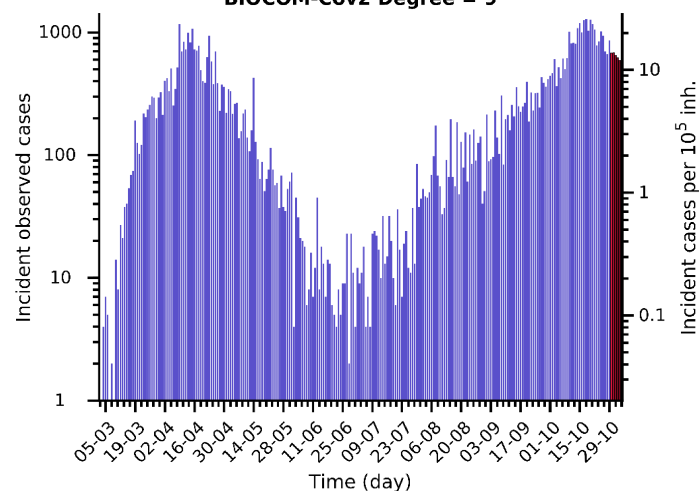
Day	Number of cases	95% Confidence Interval
30-10-2020	60975 (+678)	[60297 - 61860]
01-11-2020	62311 (+652)	[61400 - 63221]
03-11-2020	63526 (+593)	[62568 - 64484]

Current indicators

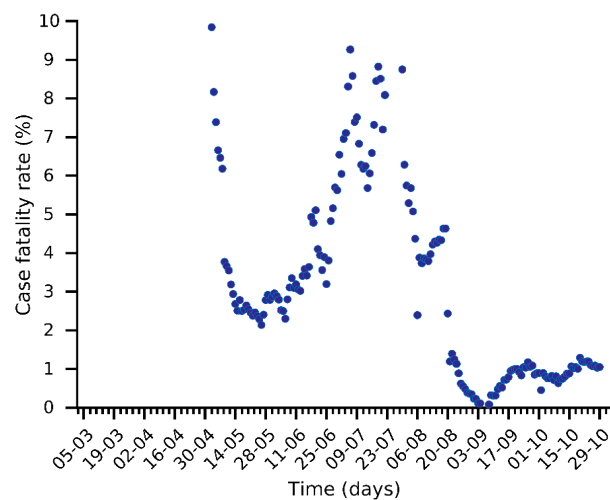
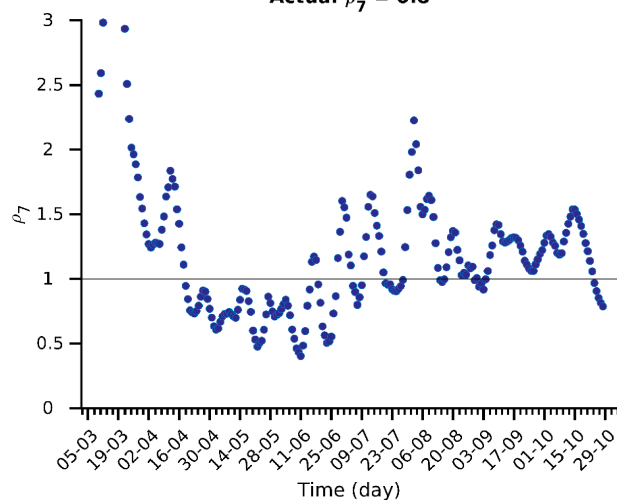
A ₁₄	EPG	CFR
281	221	1.05 %



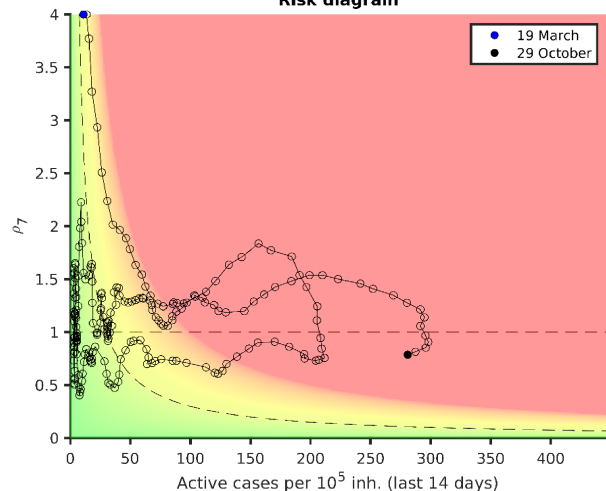
BIOCOM-Cov2 Degree = 9



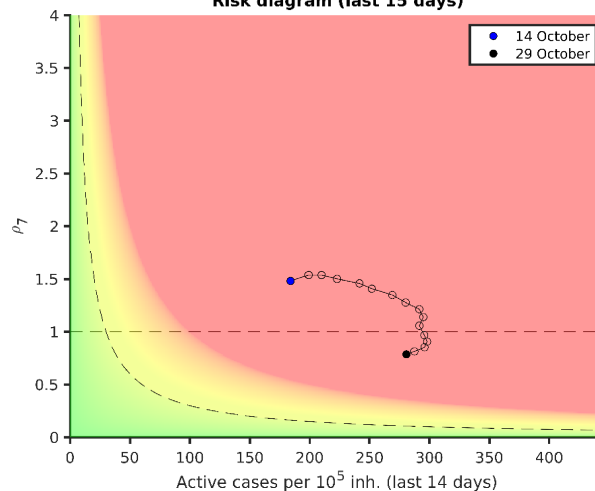
Actual $\rho_7 = 0.8$



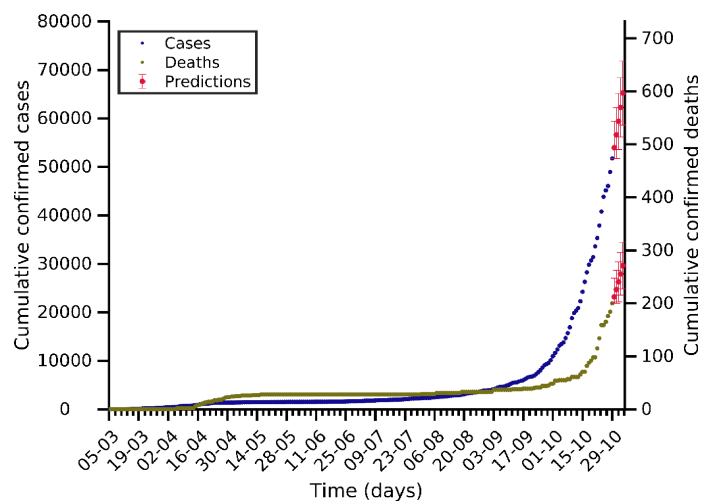
Risk diagram



Risk diagram (last 15 days)



Slovakia 29-10-2020. Pop: 5.5M. Cumulative incidence: 947/10⁵

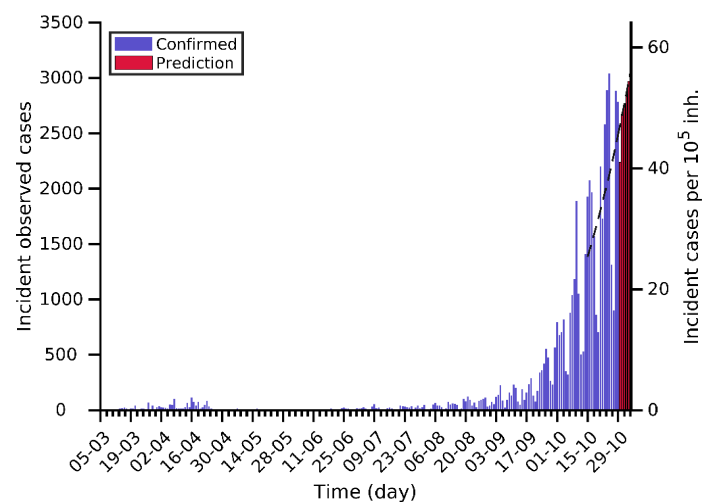


Predictions for next days

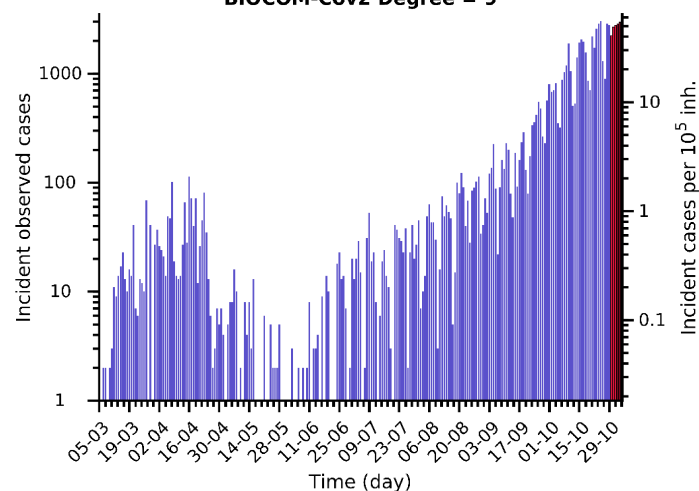
Day	Number of cases	95% Confidence Interval
30-10-2020	53965 (+2237)	[51728 - 59424]
01-11-2020	59406 (+2769)	[53620 - 65192]
03-11-2020	65243 (+2969)	[58638 - 71848]

Current indicators

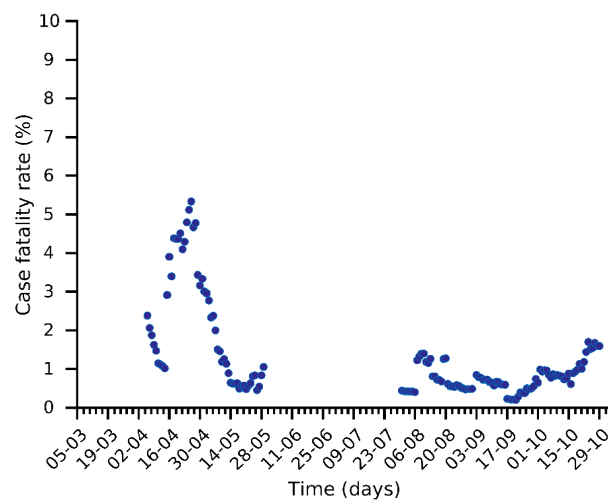
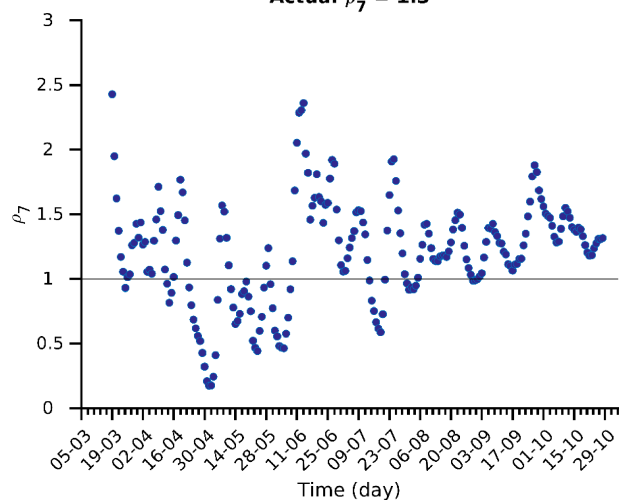
A ₁₄	EPG	CFR
504	663	1.59 %



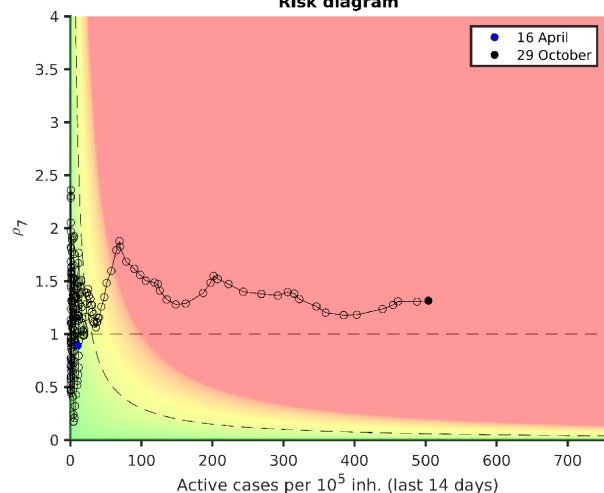
BIOCOM-Cov2 Degree = 9



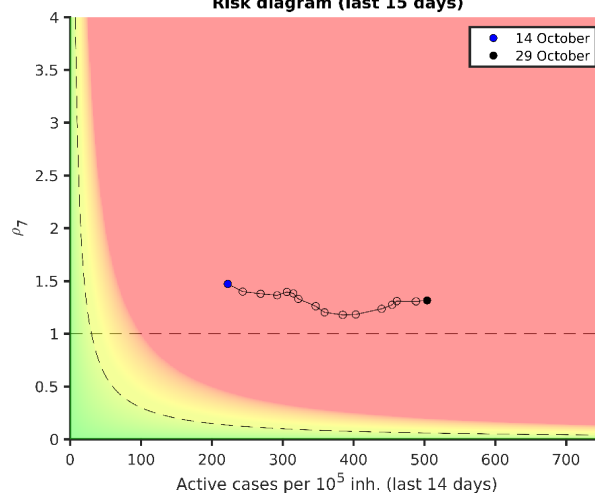
Actual $\rho_7 = 1.3$



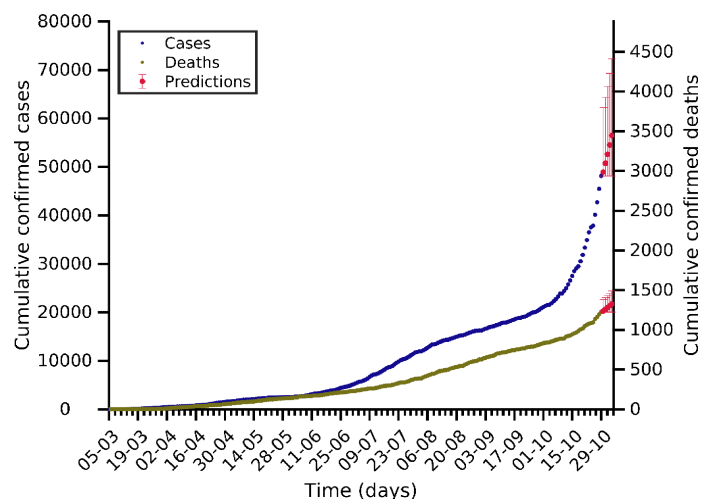
Risk diagram



Risk diagram (last 15 days)



Bulgaria 29-10-2020. Pop: 6.9M. Cumulative incidence: 693/10⁵

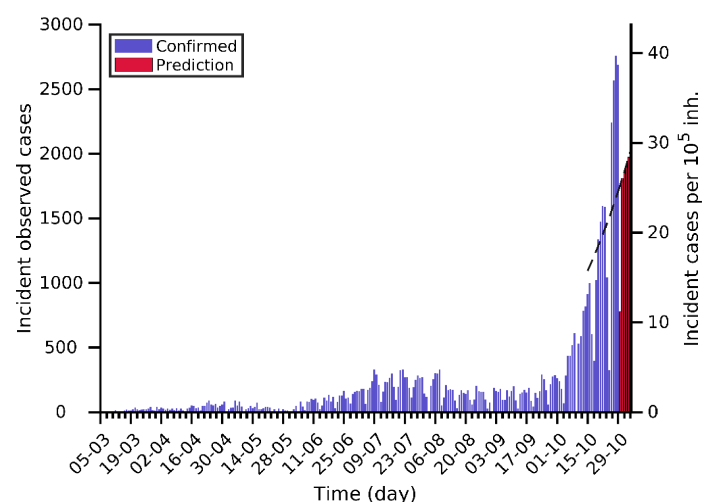


Predictions for next days

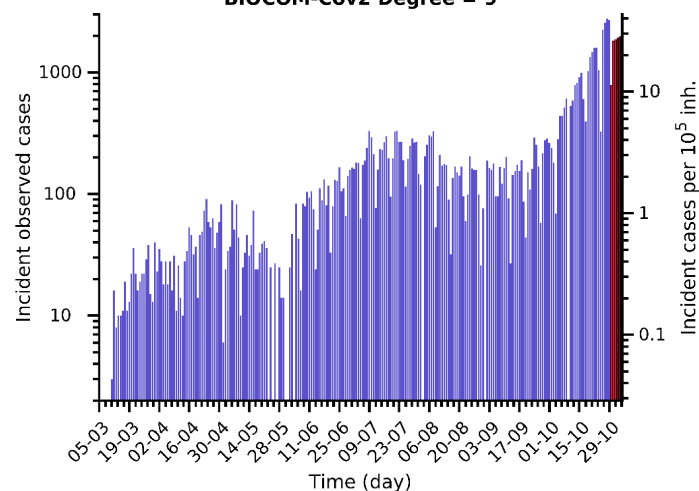
Day	Number of cases	95% Confidence Interval
30-10-2020	48929 (+779)	[48150 - 62246]
01-11-2020	52603 (+1864)	[48150 - 66648]
03-11-2020	56497 (+1975)	[48150 - 72313]

Current indicators

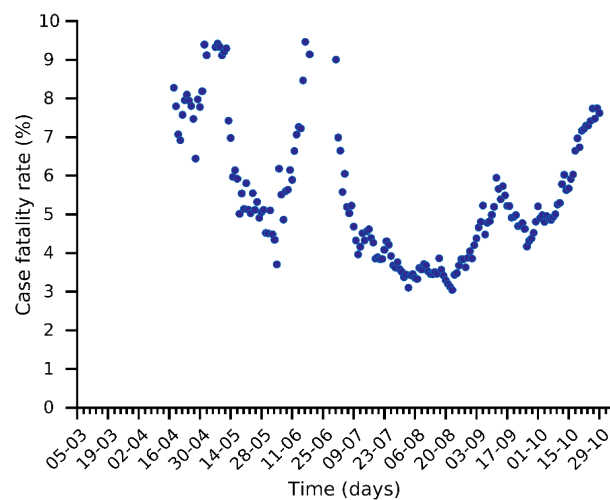
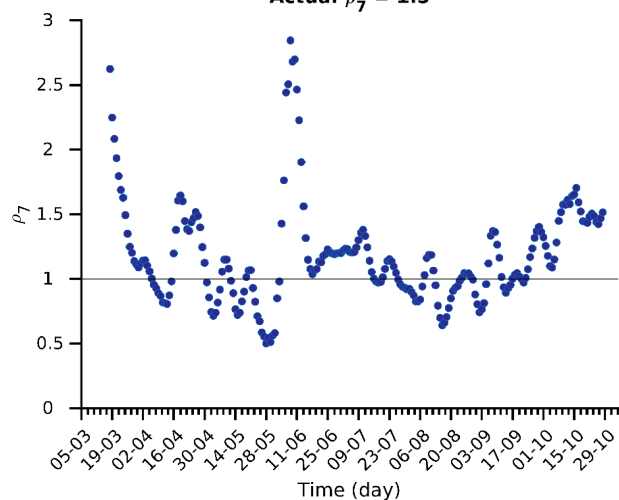
A ₁₄	EPG	CFR
297	450	7.62 %



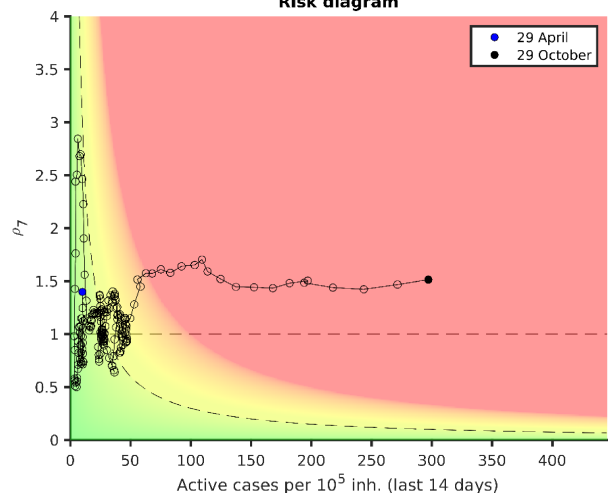
BIOCOM-Cov2 Degree = 9



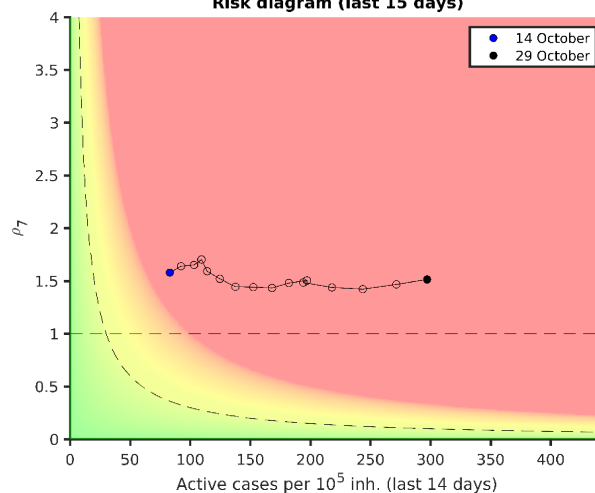
Actual $\rho_7 = 1.5$



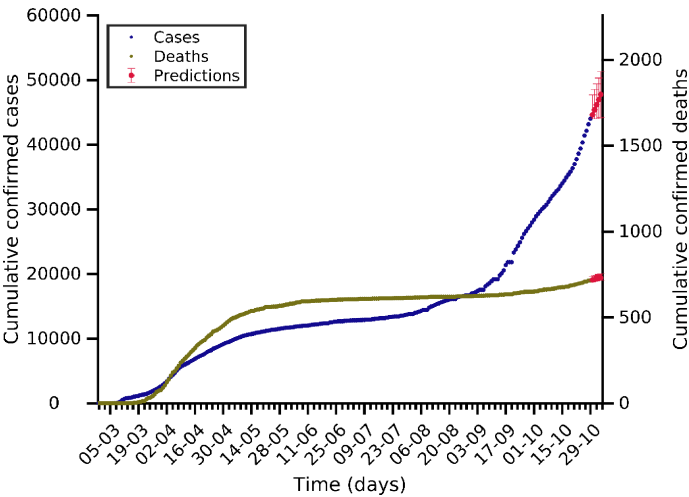
Risk diagram



Risk diagram (last 15 days)

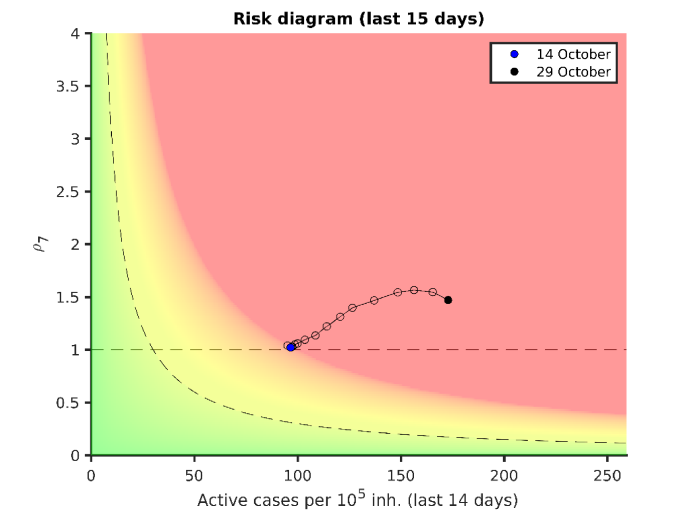
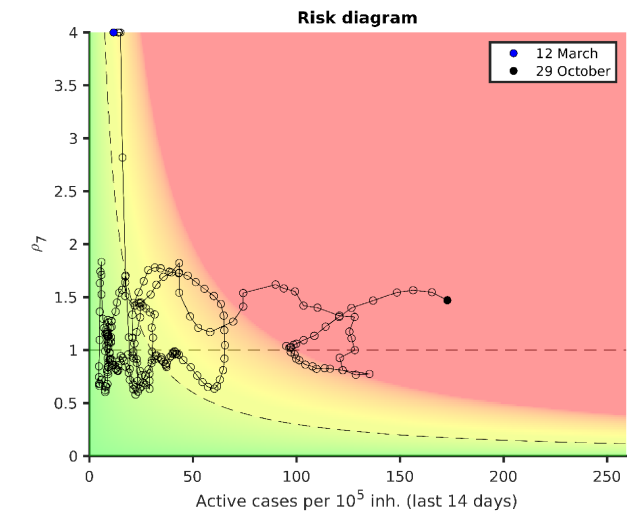
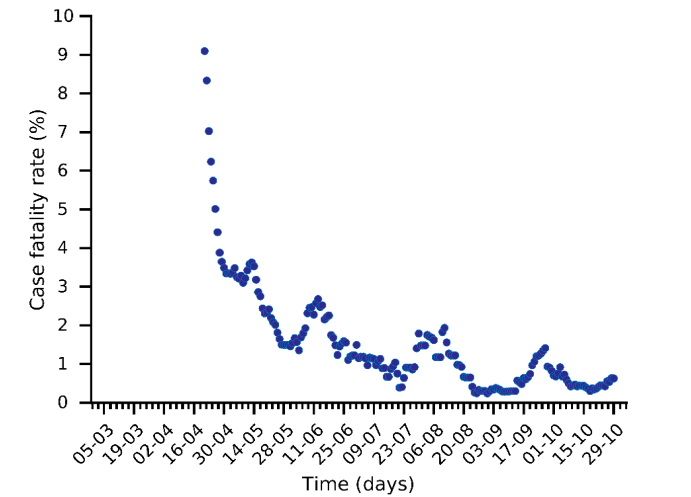
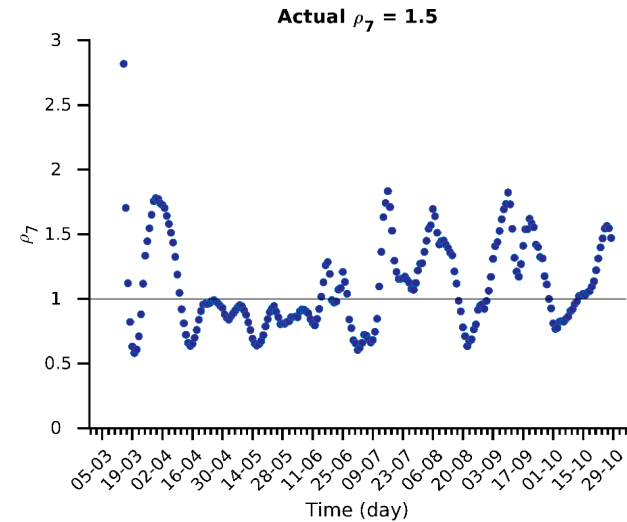
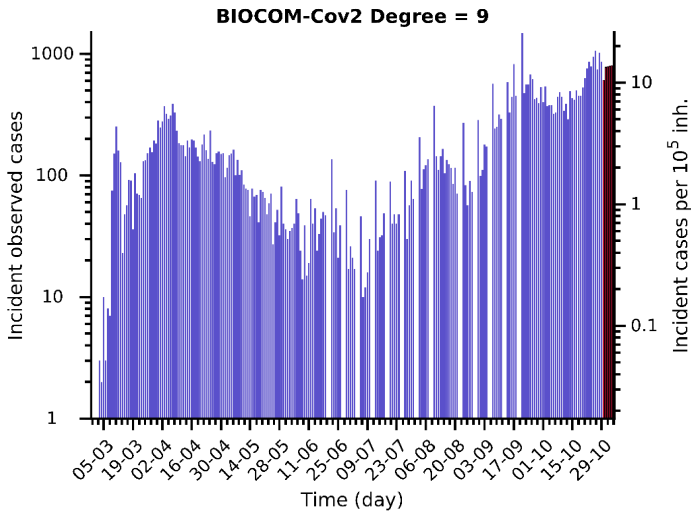
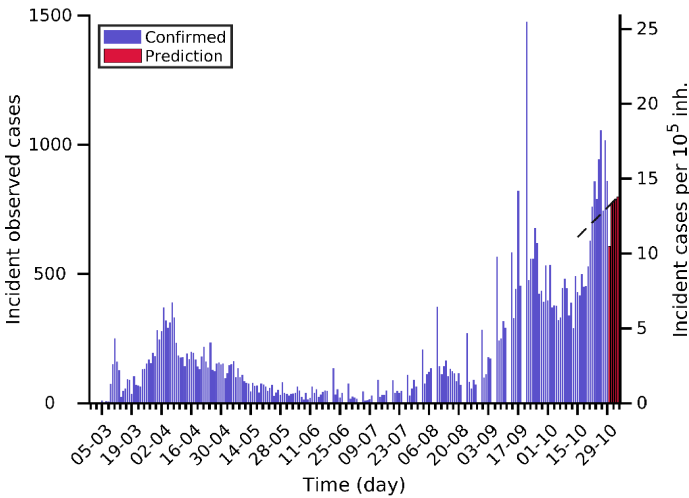


Denmark 29-10-2020. Pop: 5.8M. Cumulative incidence: 760/10⁵

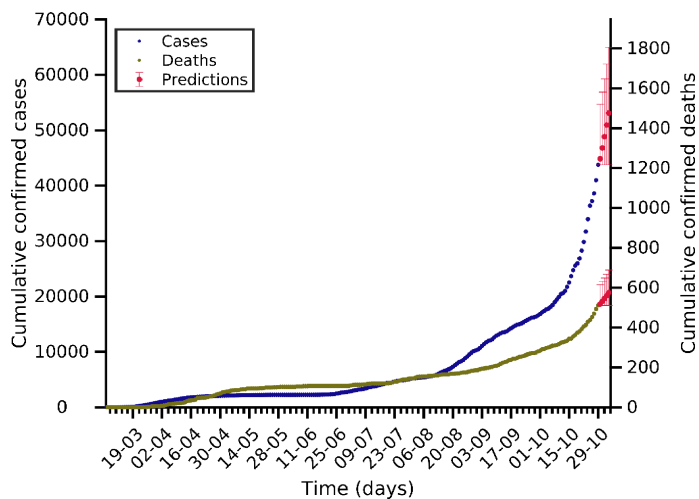


Predictions for next days		
Day	Number of cases	95% Confidence Interval
30-10-2020	44640 (+606)	[44034 - 47720]
01-11-2020	46195 (+782)	[44034 - 49412]
03-11-2020	47783 (+798)	[44257 - 51309]

Current indicators		
A ₁₄	EPG	CFR
173	254	0.62 %



Croatia 29-10-2020. Pop: 4.1M. Cumulative incidence: 1066/10⁵

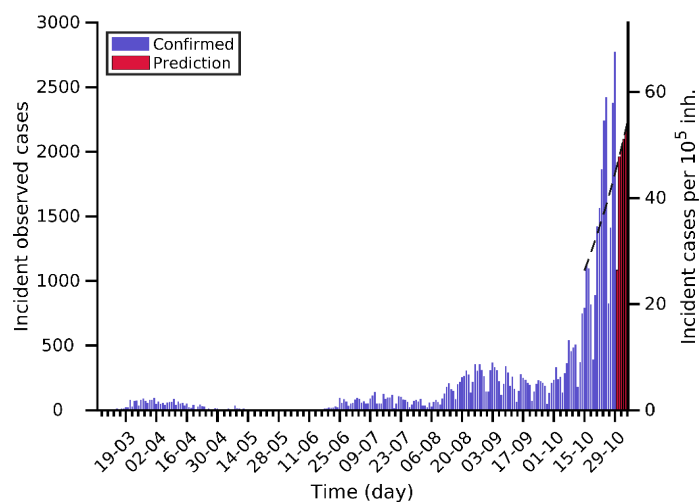


Predictions for next days

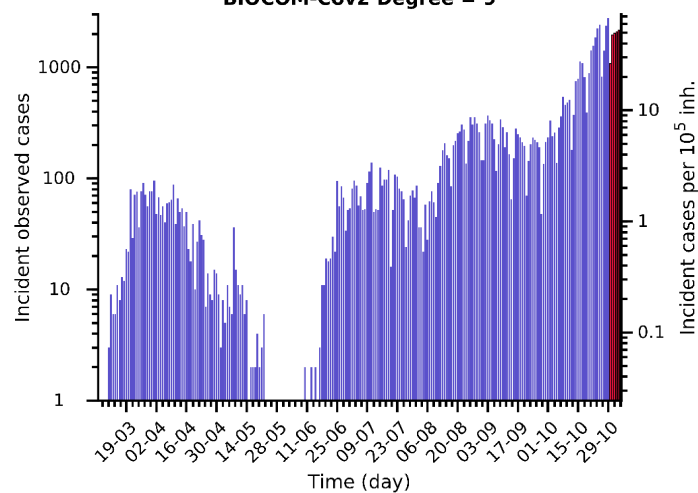
Day	Number of cases	95% Confidence Interval
30-10-2020	44858 (+1083)	[43775 - 54713]
01-11-2020	48849 (+2030)	[43775 - 59275]
03-11-2020	53119 (+2170)	[43775 - 64958]

Current indicators

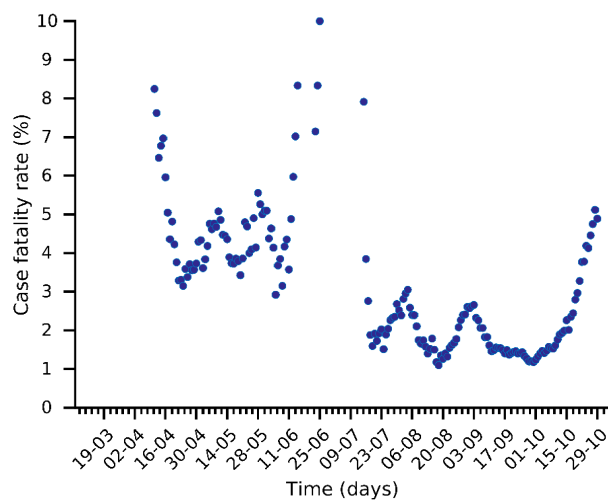
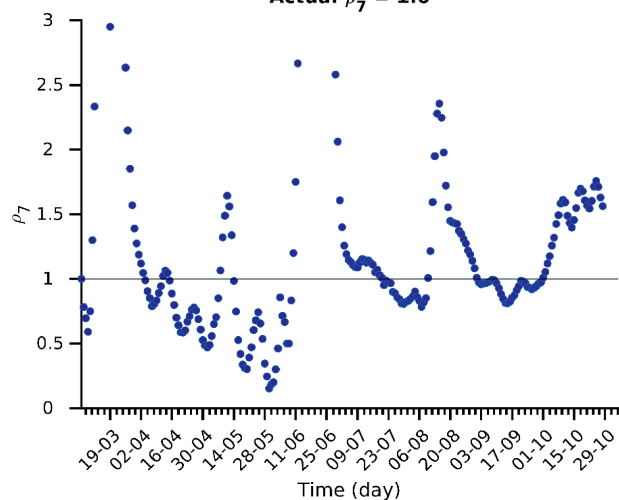
A ₁₄	EPG	CFR
517	809	4.89 %



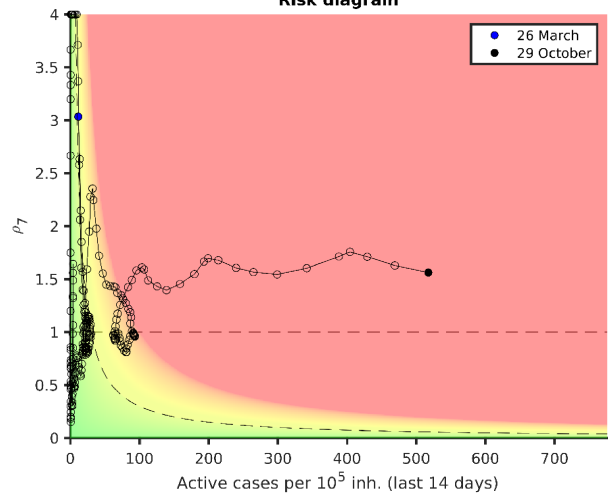
BIOCOM-Cov2 Degree = 9



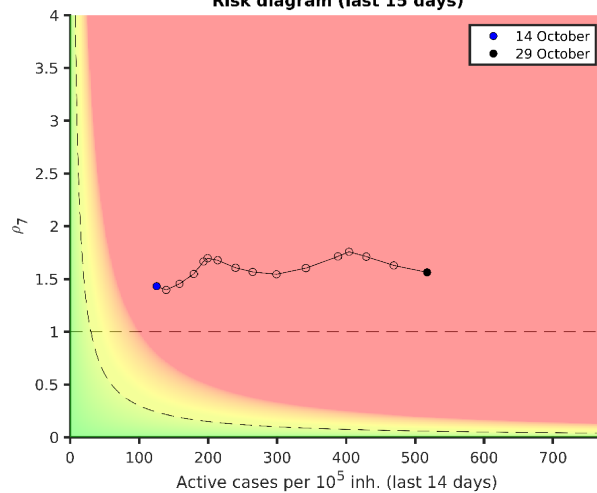
Actual $\rho_7 = 1.6$



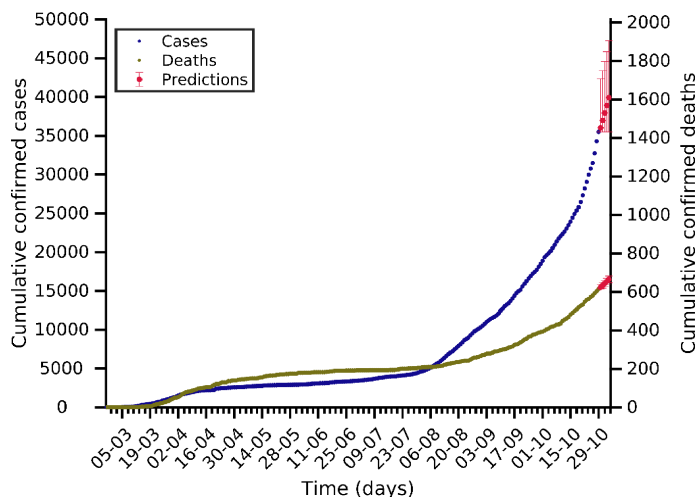
Risk diagram



Risk diagram (last 15 days)



Greece 29-10-2020. Pop: 10.4M. Cumulative incidence: 341/10⁵

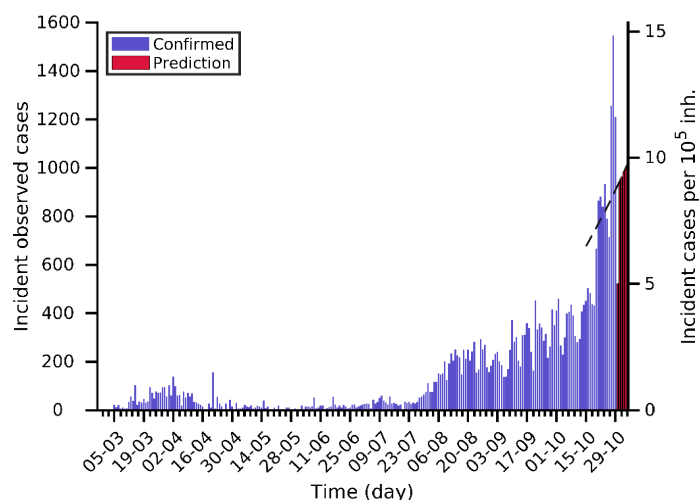


Predictions for next days

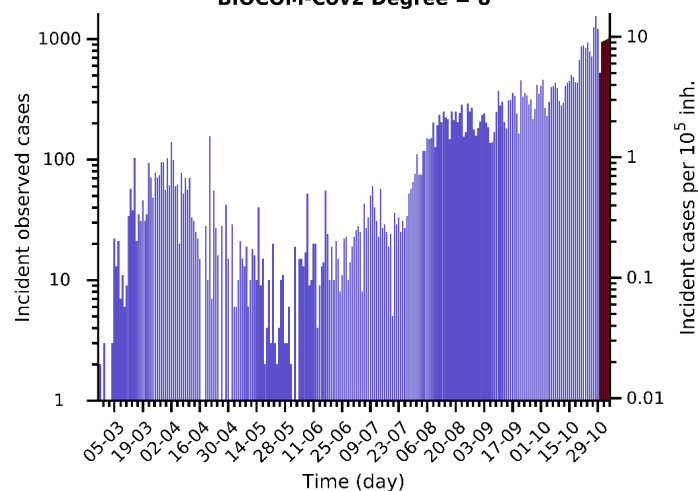
Day	Number of cases	95% Confidence Interval
30-10-2020	36032 (+522)	[35510 - 42350]
01-11-2020	37939 (+963)	[35510 - 44568]
03-11-2020	39922 (+1001)	[35510 - 47274]

Current indicators

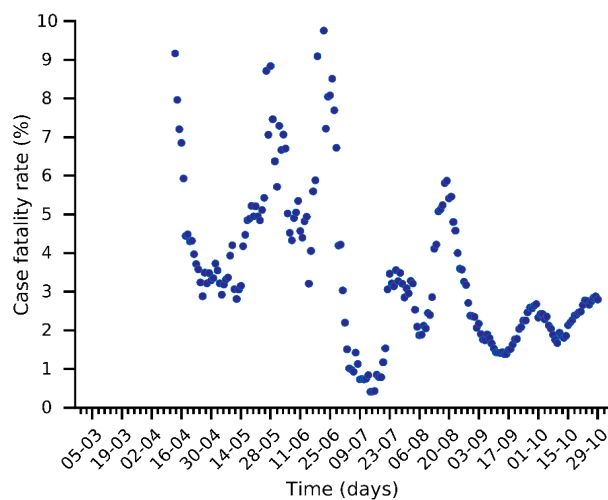
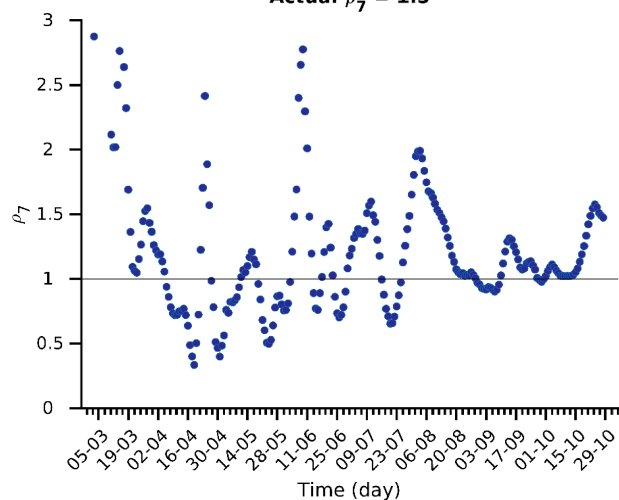
A ₁₄	EPG	CFR
111	164	2.80 %



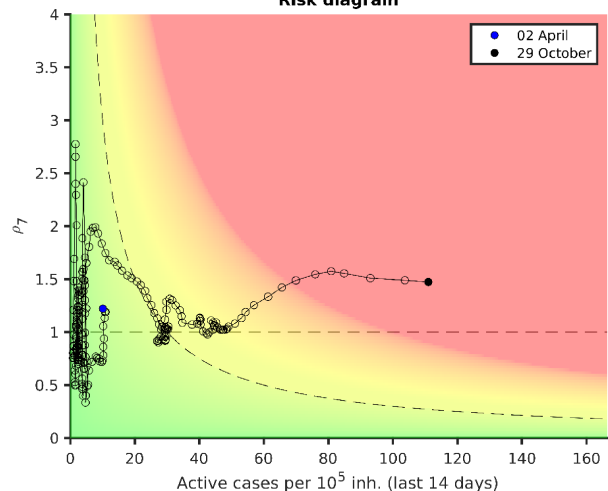
BIOCOM-Cov2 Degree = 8



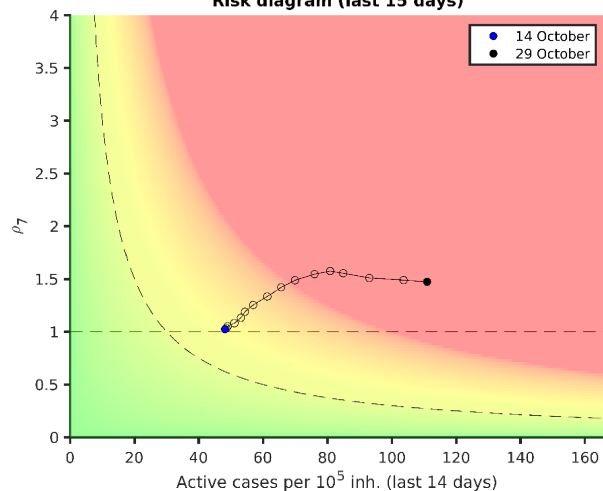
Actual $\rho_7 = 1.5$



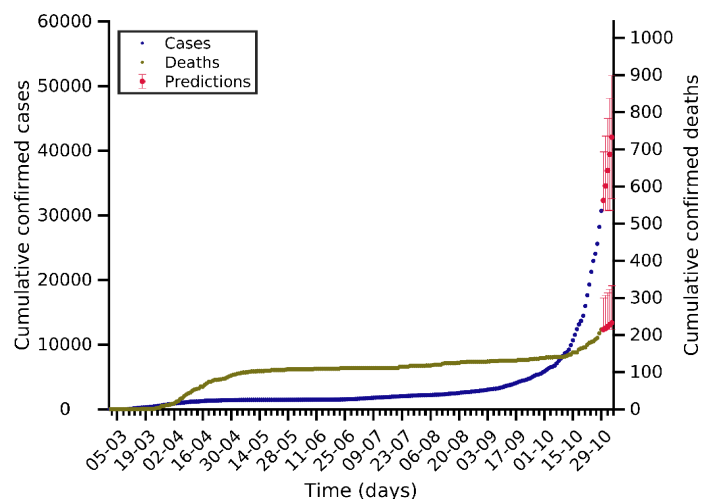
Risk diagram



Risk diagram (last 15 days)



Slovenia 29-10-2020. Pop: 2.1M. Cumulative incidence: 1477/10⁵

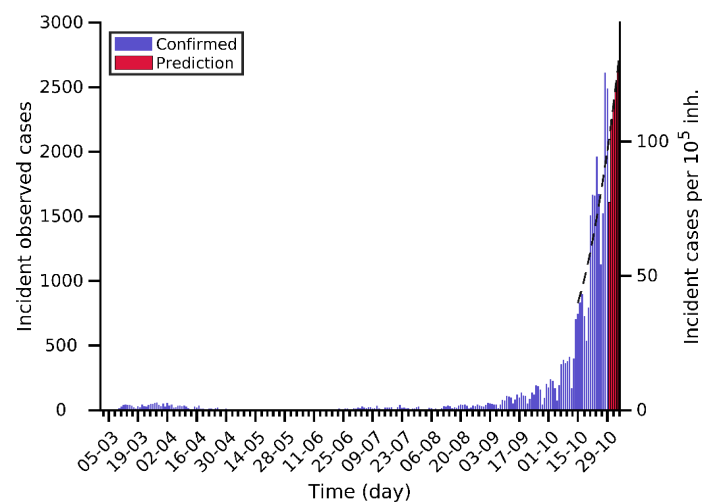


Predictions for next days

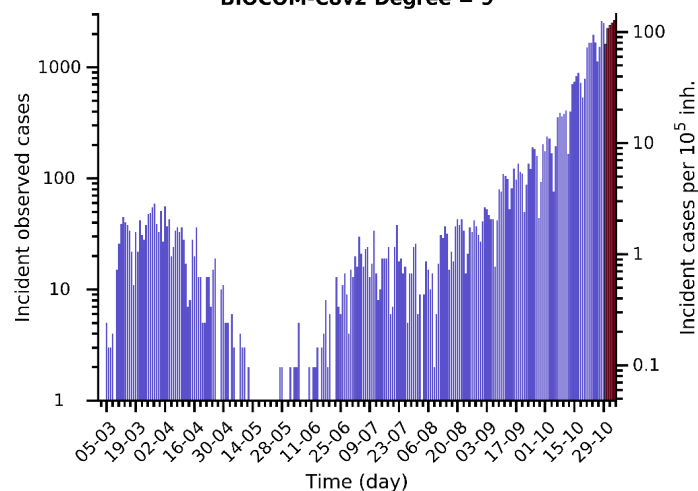
Day	Number of cases	95% Confidence Interval
30-10-2020	32315 (+1610)	[30705 - 39823]
01-11-2020	36937 (+2375)	[30705 - 44990]
03-11-2020	42092 (+2647)	[32574 - 51611]

Current indicators

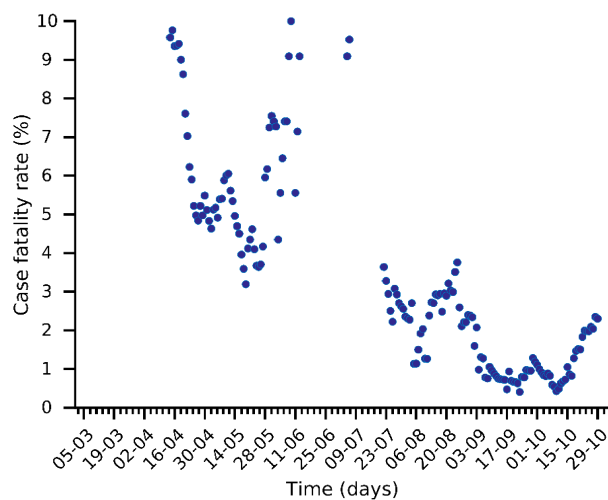
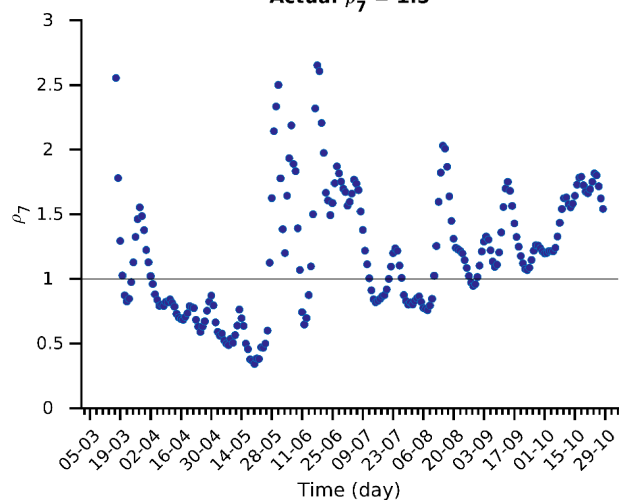
A ₁₄	EPG	CFR
963	1484	2.30 %



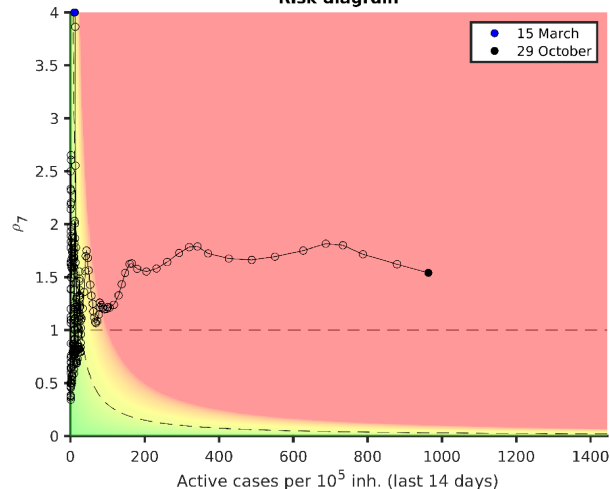
BIOCOM-Cov2 Degree = 9



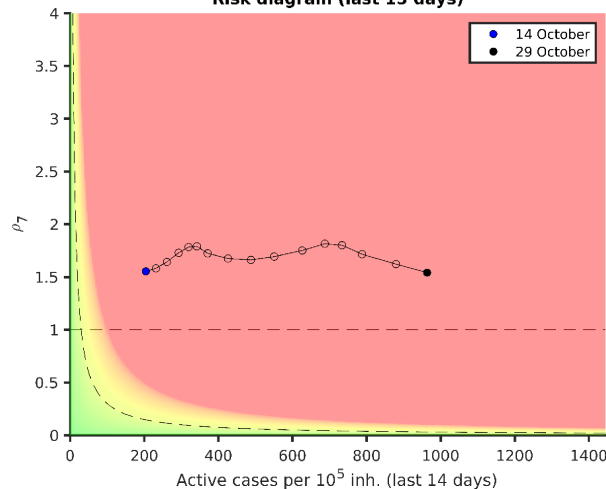
Actual $\rho_7 = 1.5$



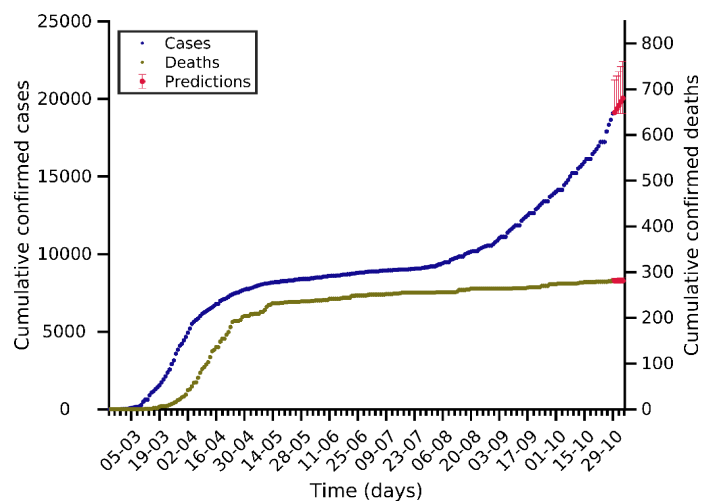
Risk diagram



Risk diagram (last 15 days)



Norway 29-10-2020. Pop: 5.4M. Cumulative incidence: 352/10⁵

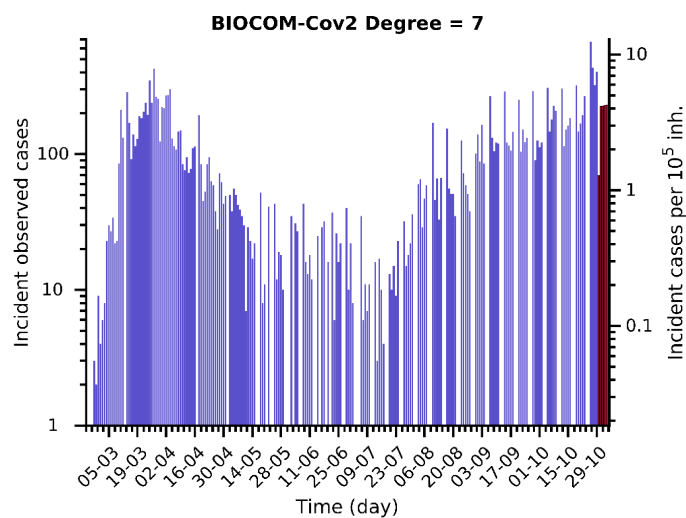
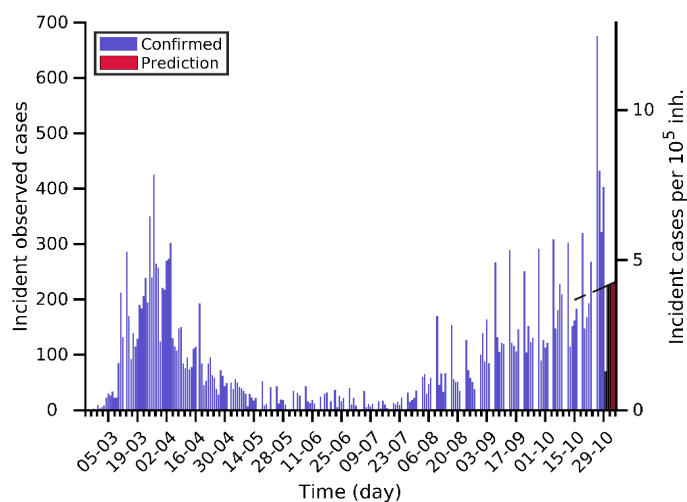


Predictions for next days

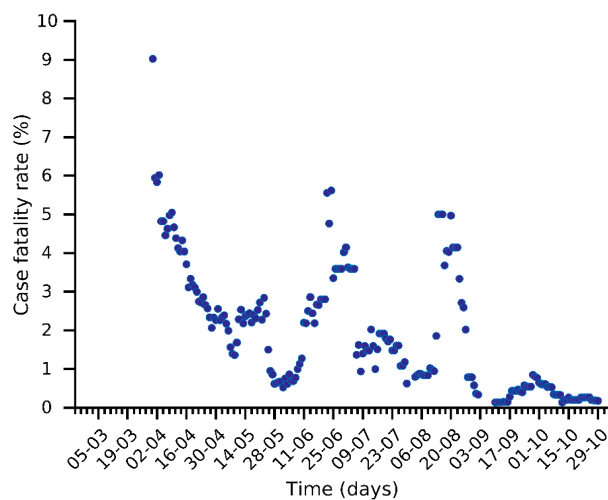
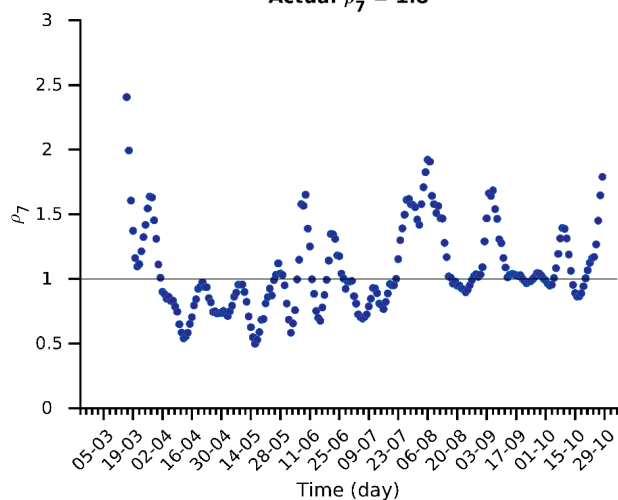
Day	Number of cases	95% Confidence Interval
30-10-2020	19135 (+69)	[19066 - 21233]
01-11-2020	19588 (+227)	[19066 - 21774]
03-11-2020	20046 (+230)	[19066 - 22431]

Current indicators

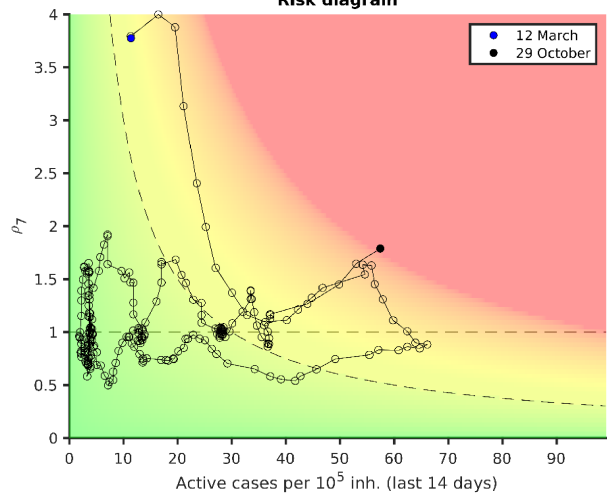
A ₁₄	EPG	CFR
57	103	0.17 %



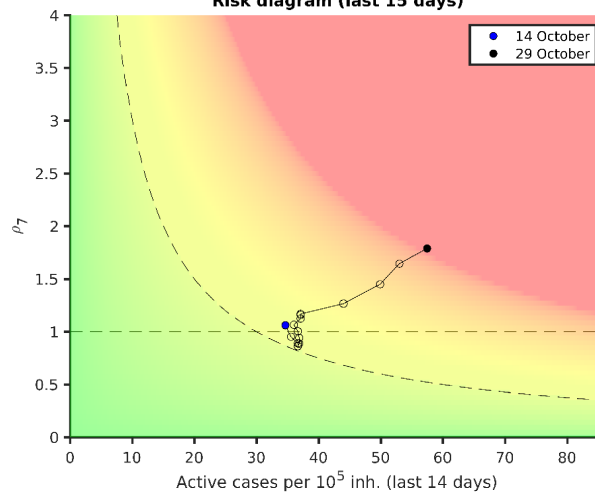
Actual $\rho_7 = 1.8$



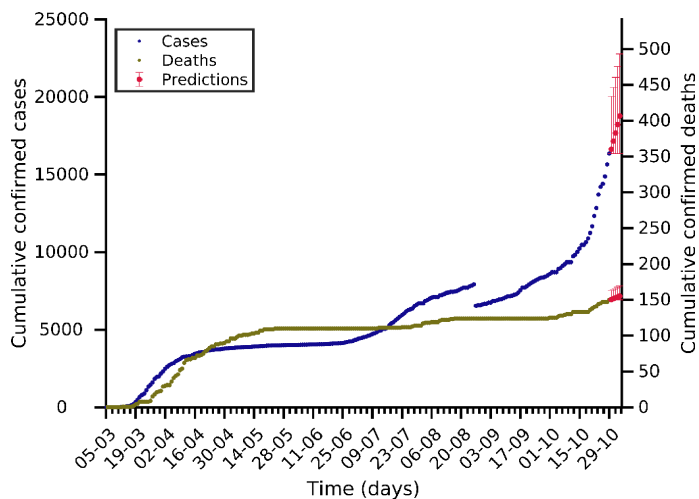
Risk diagram



Risk diagram (last 15 days)



Luxembourg 29-10-2020. Pop: 0.6M. Cumulative incidence: 2613/10⁵

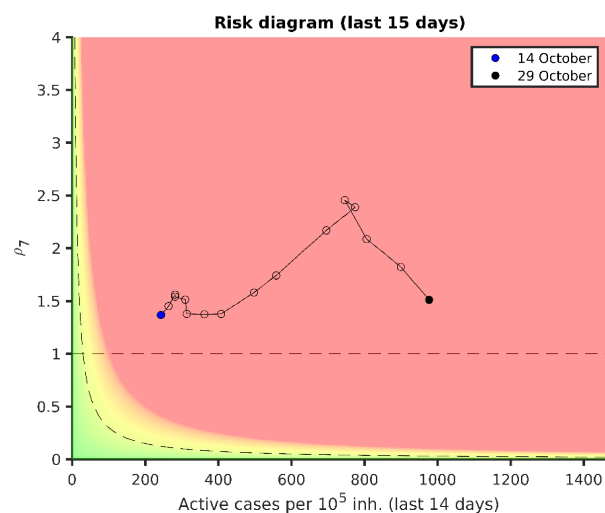
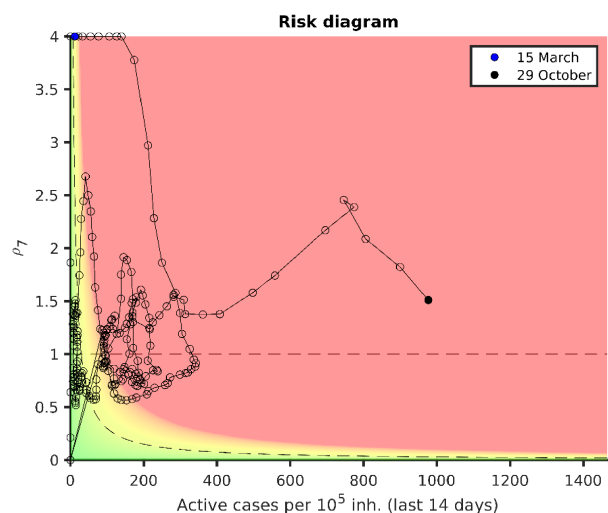
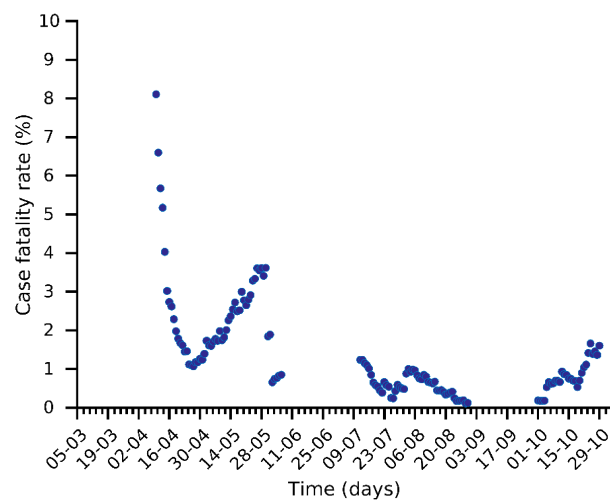
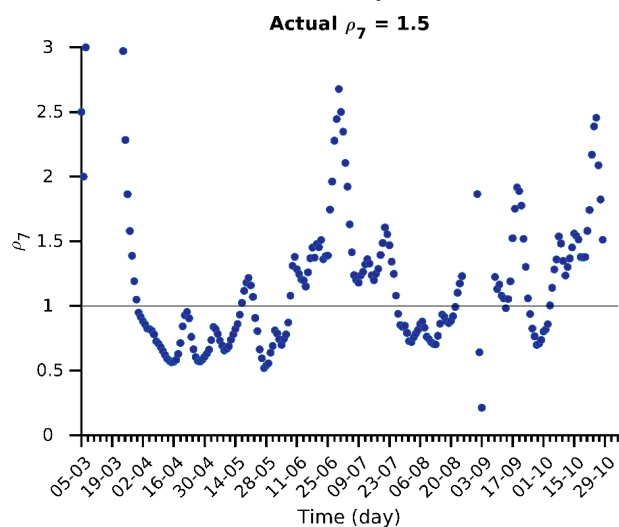
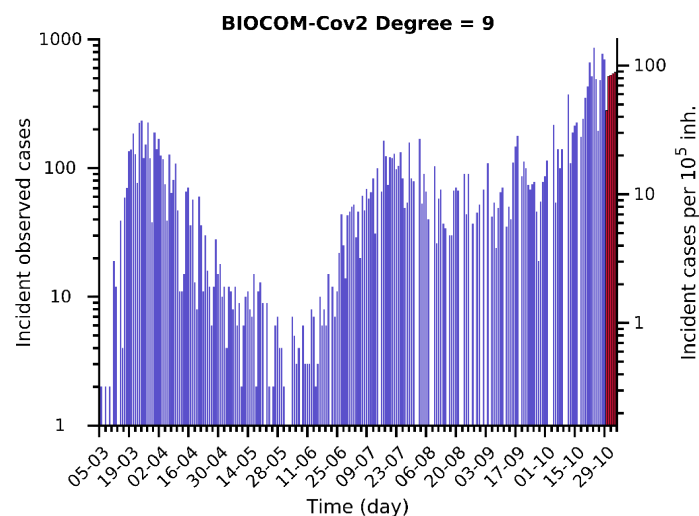
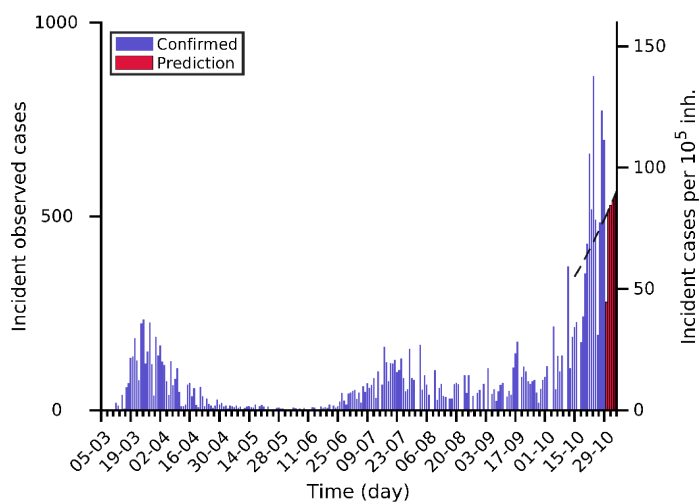


Predictions for next days

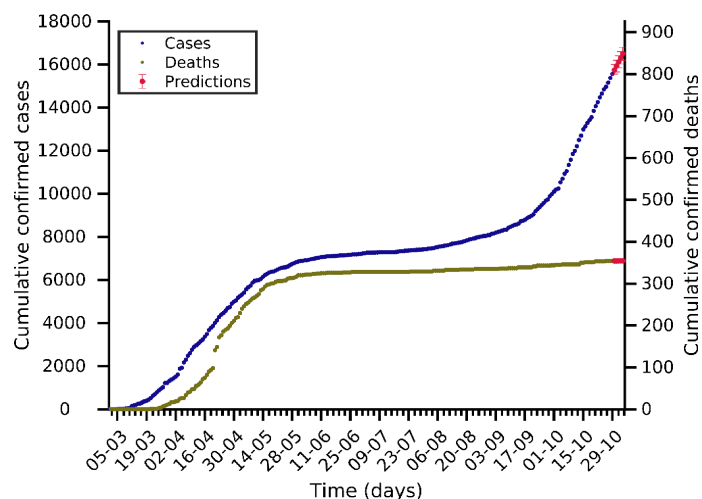
Day	Number of cases	95% Confidence Interval
30-10-2020	16635 (+279)	[16356 - 20041]
01-11-2020	17680 (+529)	[16356 - 21261]
03-11-2020	18775 (+554)	[16356 - 22772]

Current indicators

A ₁₄	EPG	CFR
976	1476	1.60 %



Finland 29-10-2020. Pop: 5.5M. Cumulative incidence: 281/10⁵

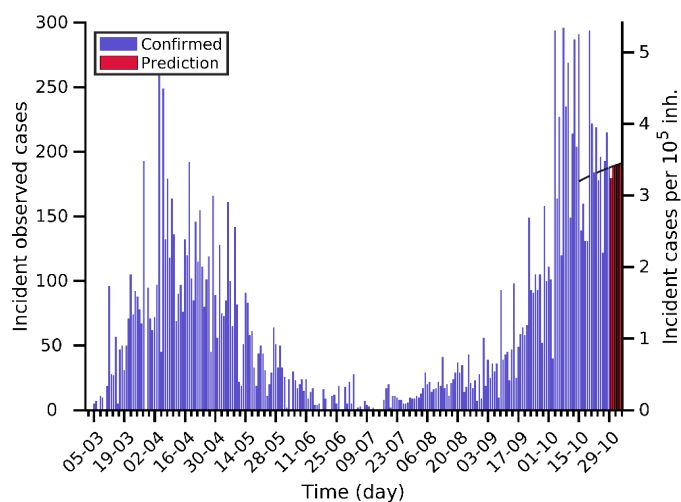


Predictions for next days

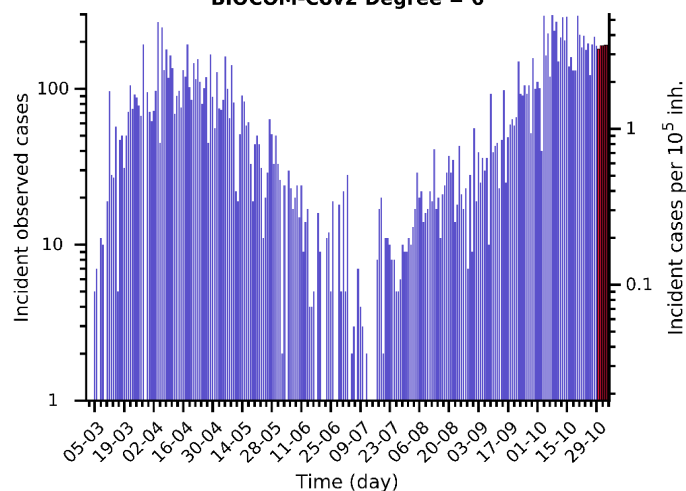
Day	Number of cases	95% Confidence Interval
30-10-2020	15745 (+179)	[15566 - 16011]
01-11-2020	16124 (+190)	[15847 - 16401]
03-11-2020	16505 (+191)	[16204 - 16805]

Current indicators

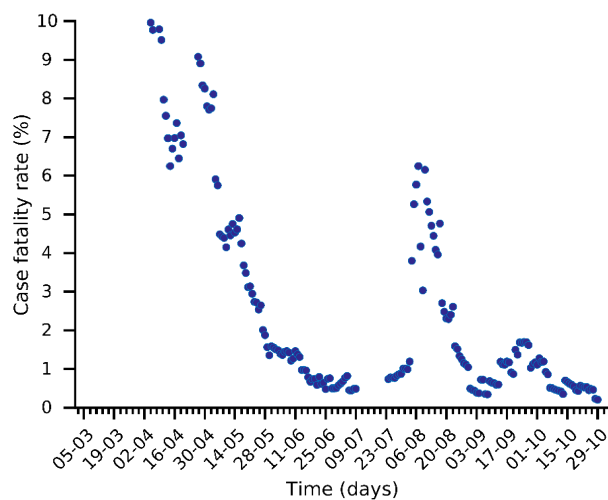
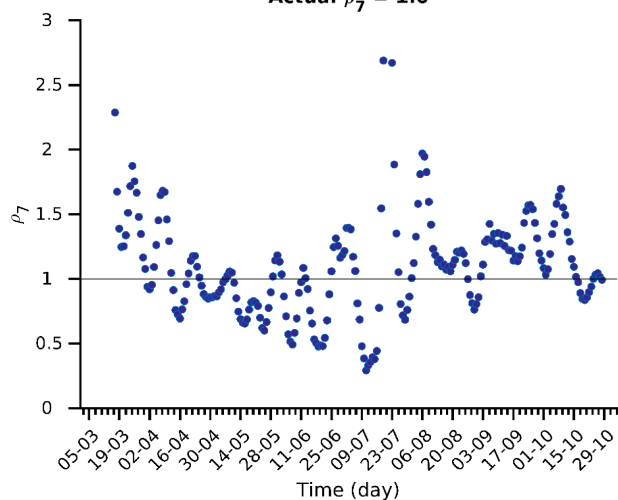
A ₁₄	EPG	CFR
46	46	0.20 %



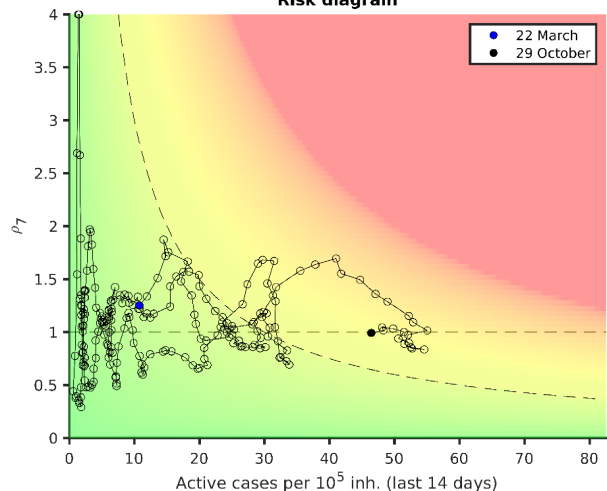
BIOCOM-Cov2 Degree = 6



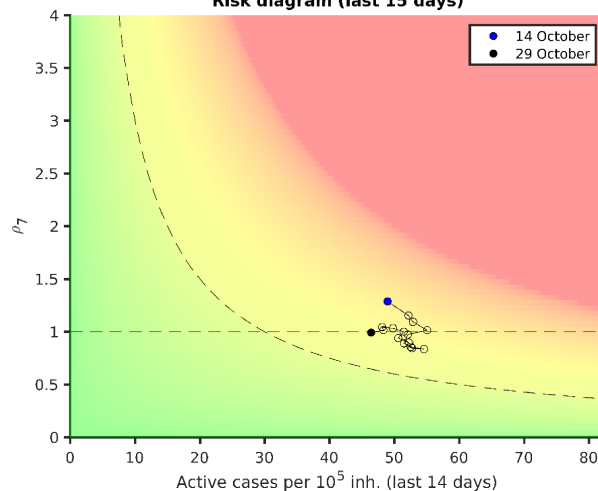
Actual $\rho_7 = 1.0$



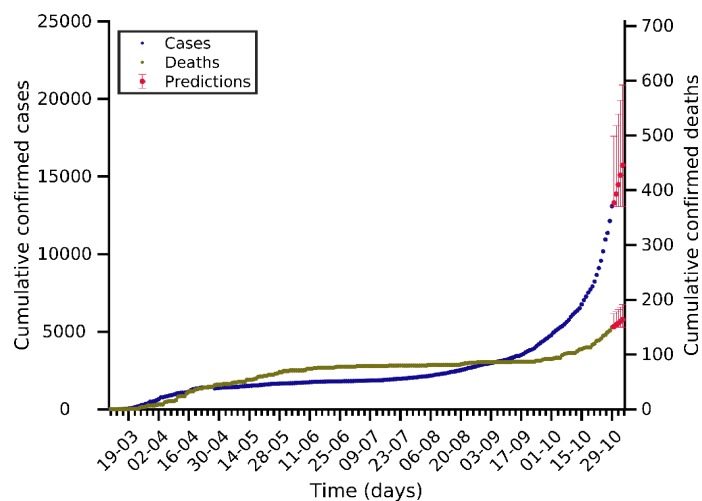
Risk diagram



Risk diagram (last 15 days)



Lithuania 29-10-2020. Pop: 2.7M. Cumulative incidence: 481/10⁵

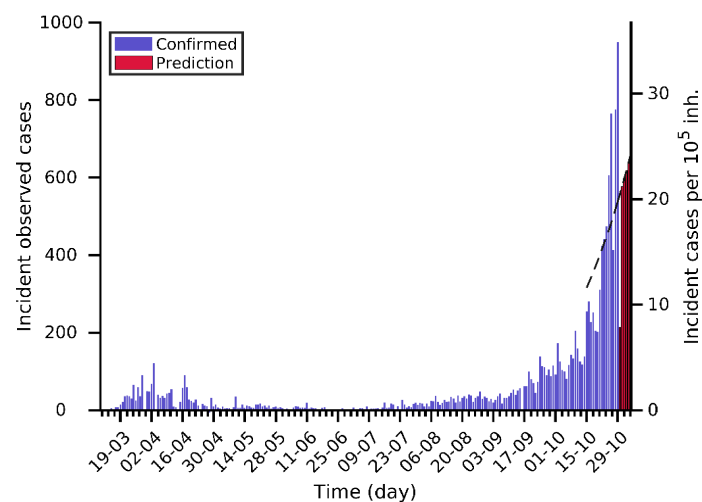


Predictions for next days

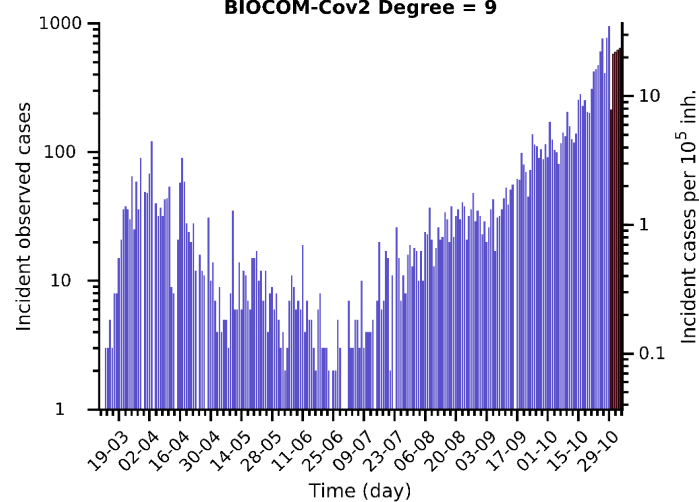
Day	Number of cases	95% Confidence Interval
30-10-2020	13302 (+214)	[13088 - 17602]
01-11-2020	14477 (+597)	[13088 - 19026]
03-11-2020	15735 (+640)	[13088 - 20905]

Current indicators

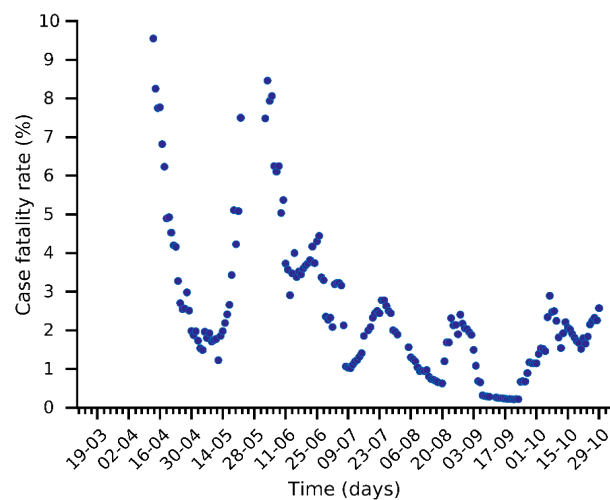
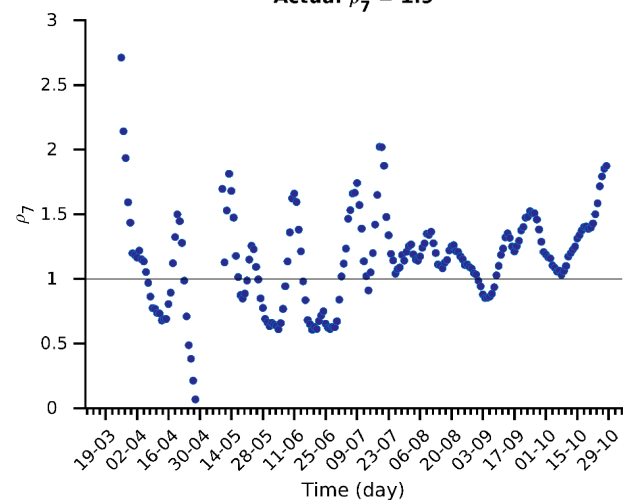
A ₁₄	EPG	CFR
232	436	2.57 %



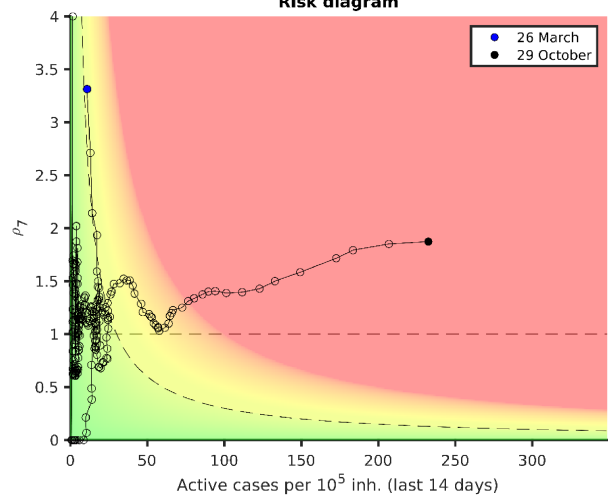
BIOCOM-Cov2 Degree = 9



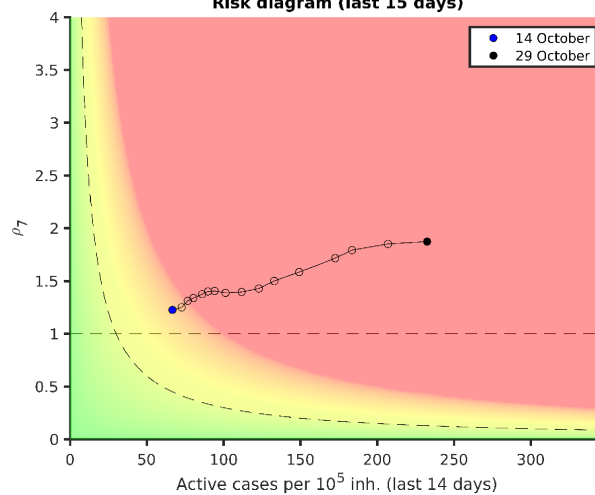
Actual $\rho_7 = 1.9$



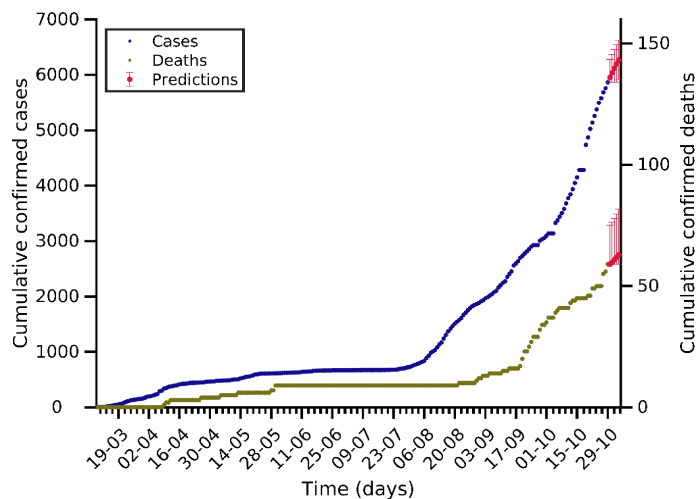
Risk diagram



Risk diagram (last 15 days)



Malta 29-10-2020. Pop: 0.4M. Cumulative incidence: 1329/10⁵

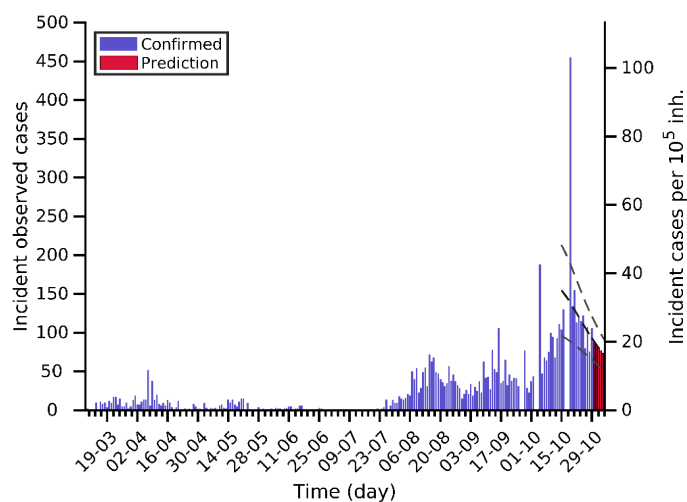


Predictions for next days

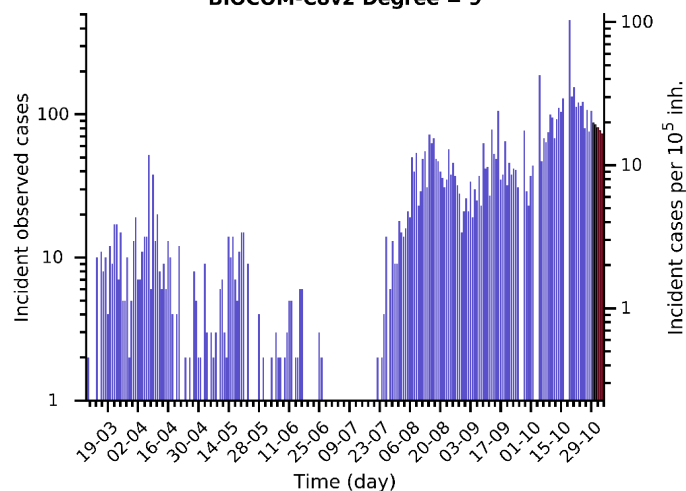
Day	Number of cases	95% Confidence Interval
30-10-2020	5953 (+87)	[5866 - 6282]
01-11-2020	6119 (+81)	[5866 - 6457]
03-11-2020	6269 (+73)	[5913 - 6625]

Current indicators

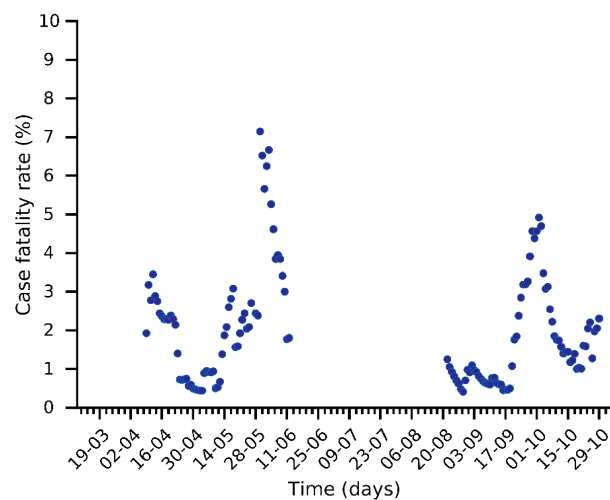
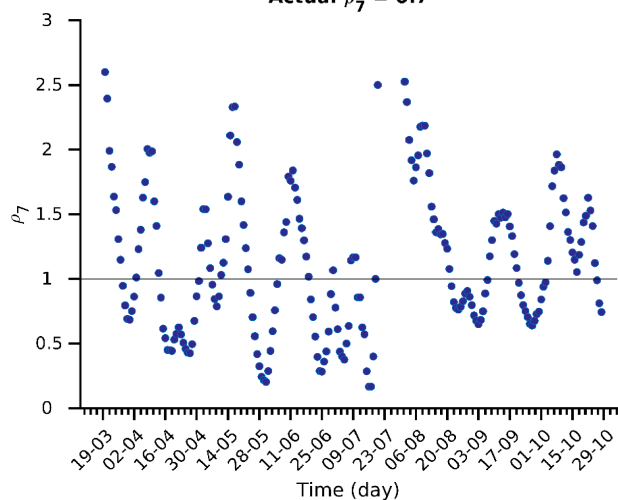
A ₁₄	EPG	CFR
388	289	2.30 %



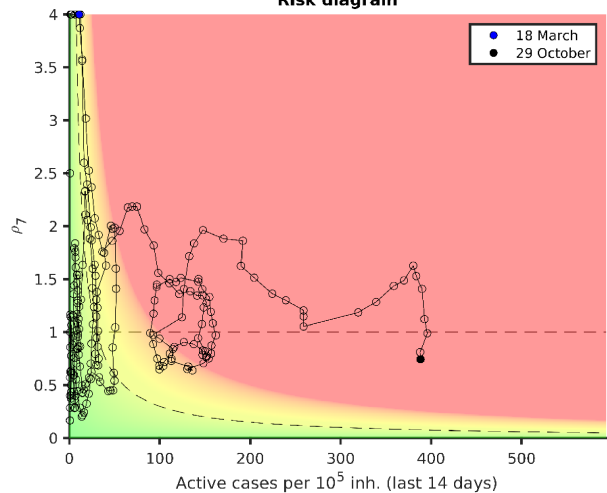
BIOCOM-Cov2 Degree = 9



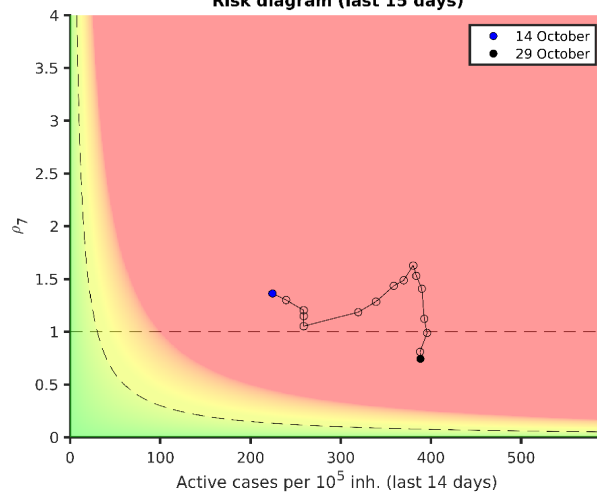
Actual $\rho_7 = 0.7$



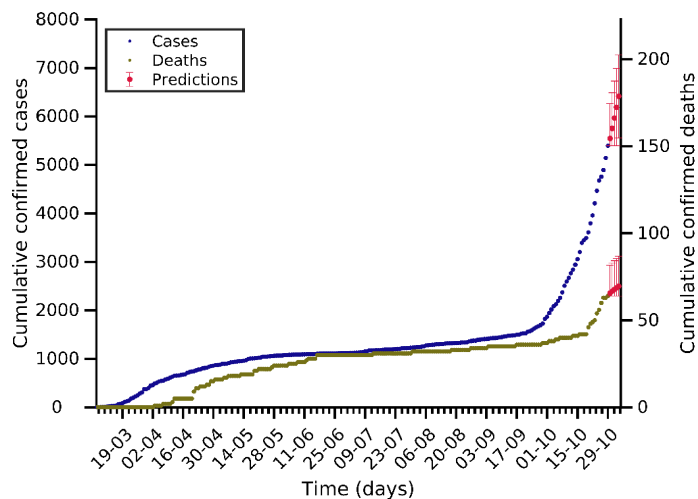
Risk diagram



Risk diagram (last 15 days)



Latvia 29-10-2020. Pop: 1.9M. Cumulative incidence: 286/10⁵

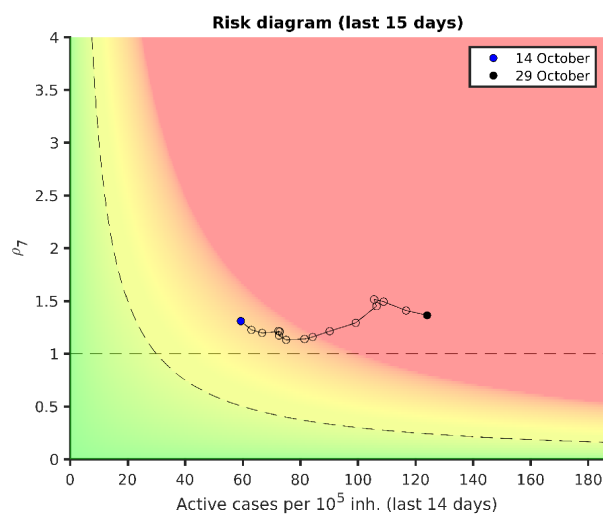
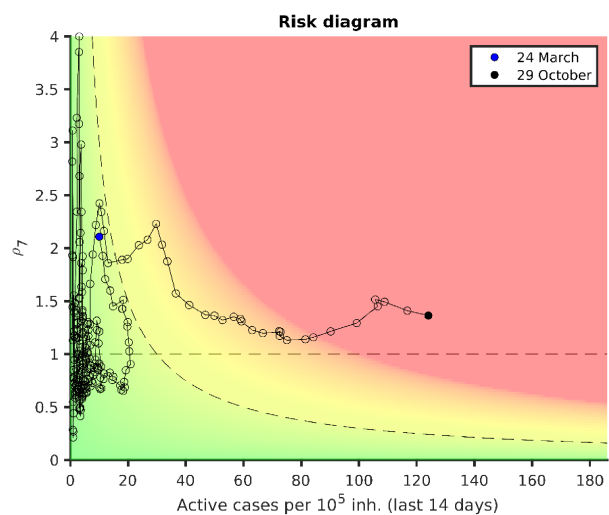
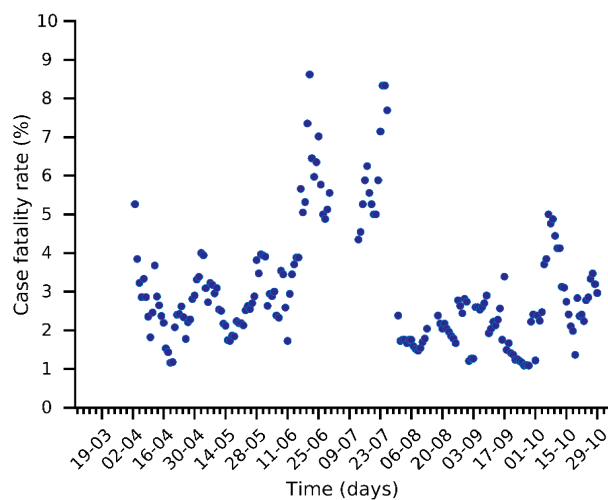
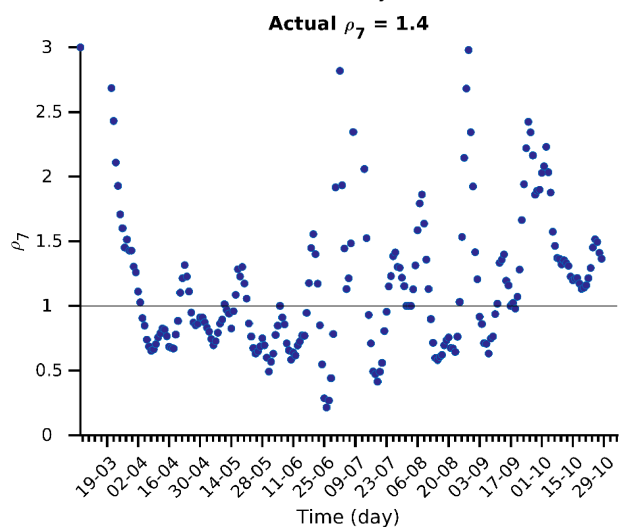
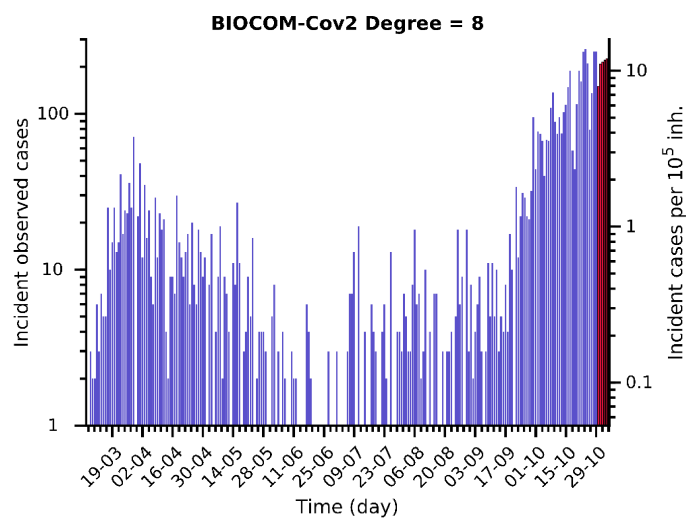
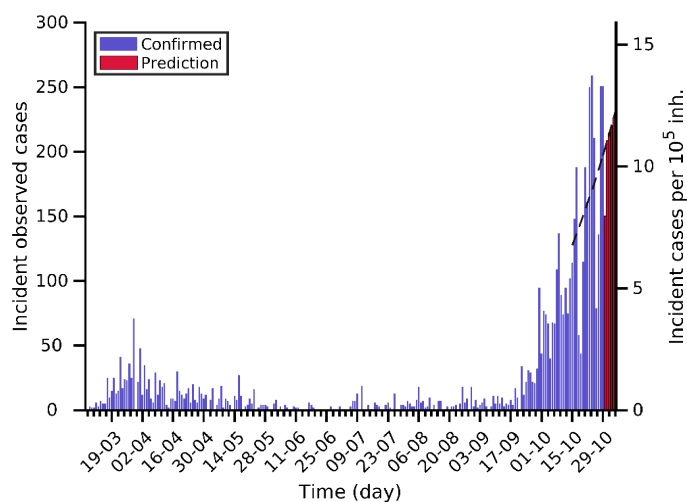


Predictions for next days

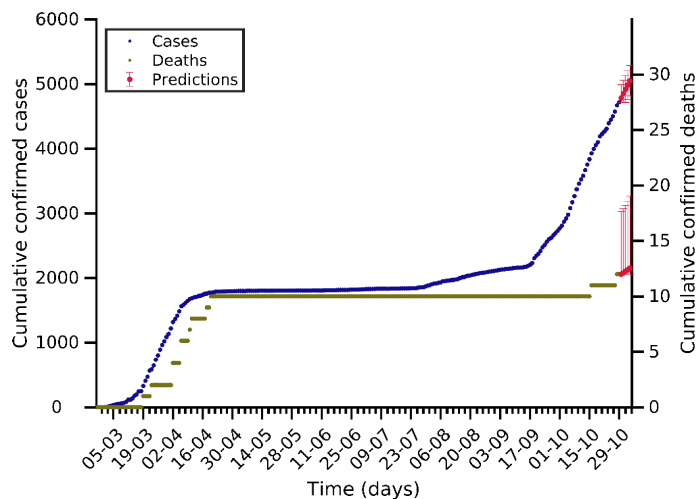
Day	Number of cases	95% Confidence Interval
30-10-2020	5545 (+150)	[5395 - 6268]
01-11-2020	5968 (+214)	[5395 - 6730]
03-11-2020	6415 (+226)	[5557 - 7272]

Current indicators

A ₁₄	EPG	CFR
124	169	2.96 %



Iceland 29-10-2020. Pop: 0.3M. Cumulative incidence: 1383/10⁵

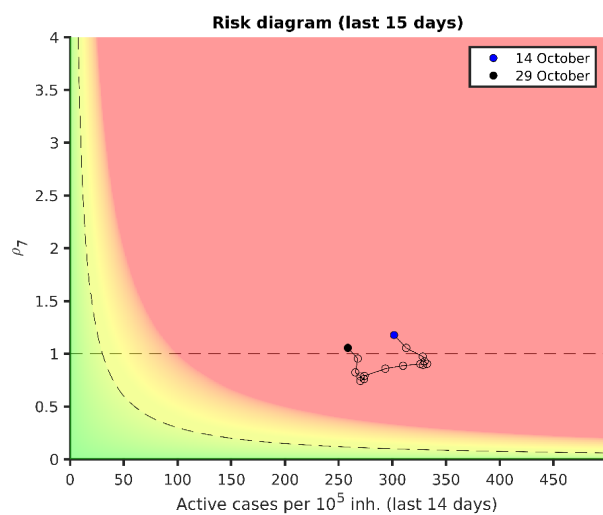
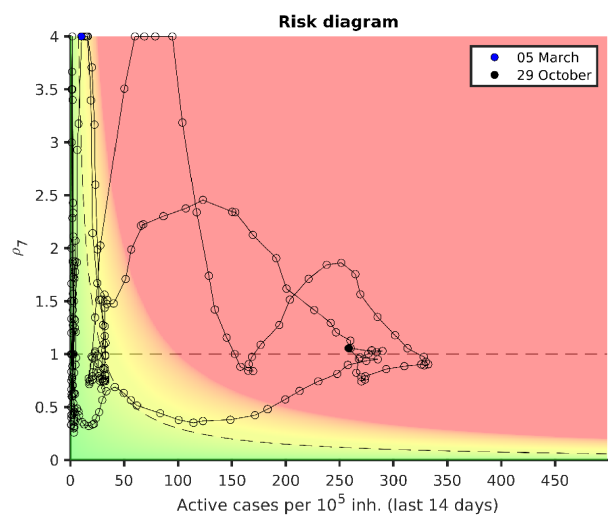
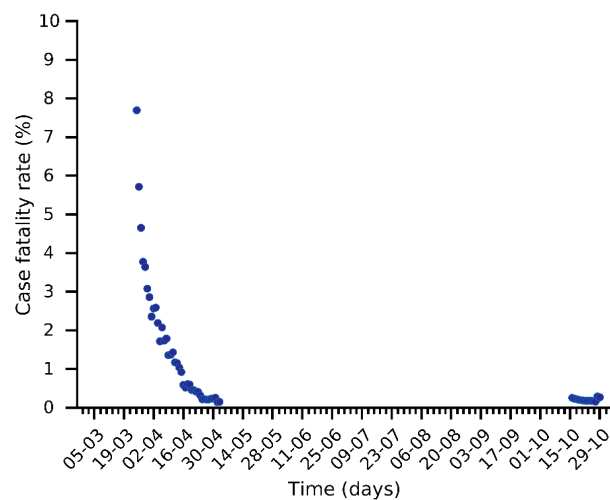
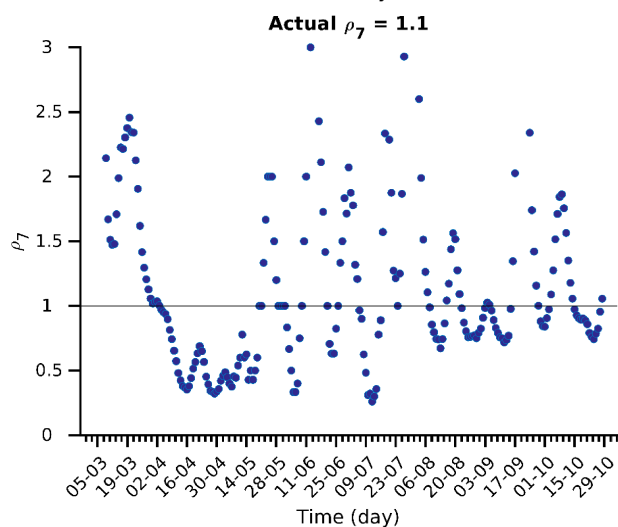
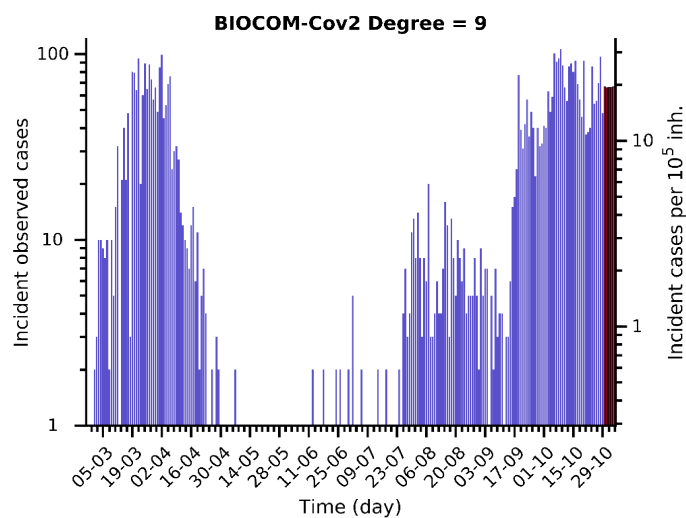
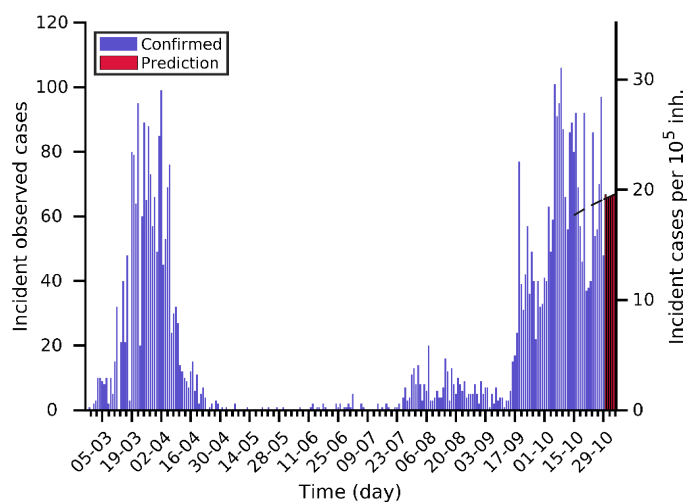


Predictions for next days

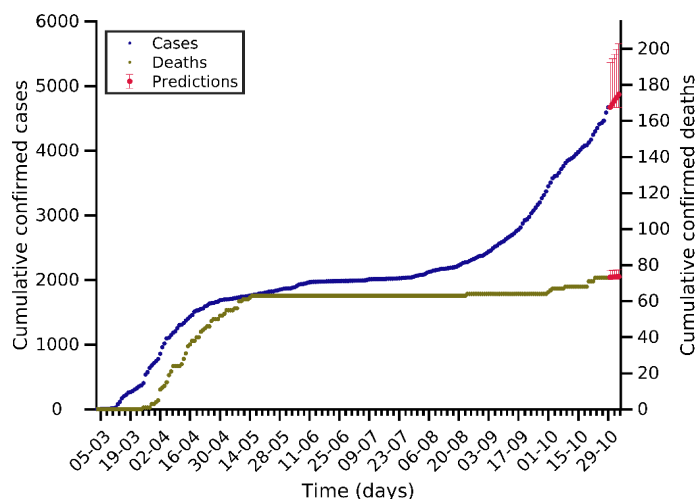
Day	Number of cases	95% Confidence Interval
30-10-2020	4786 (+67)	[4719 - 4992]
01-11-2020	4918 (+66)	[4719 - 5133]
03-11-2020	5051 (+67)	[4816 - 5285]

Current indicators

A ₁₄	EPG	CFR
258	273	0.26 %



Estonia 29-10-2020. Pop: 1.3M. Cumulative incidence: 352/10⁵

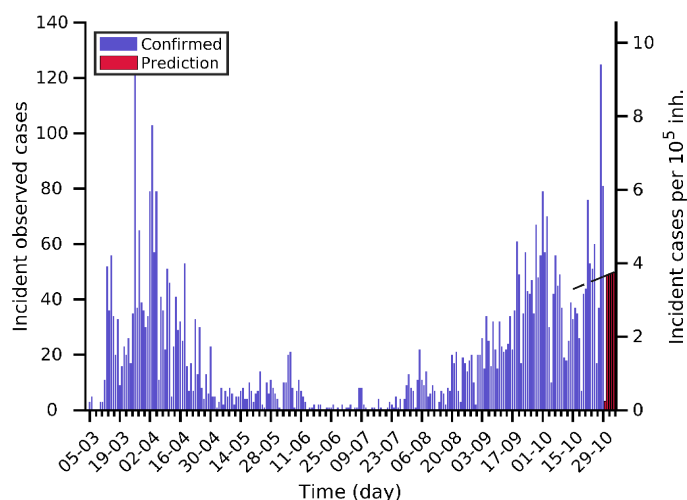


Predictions for next days

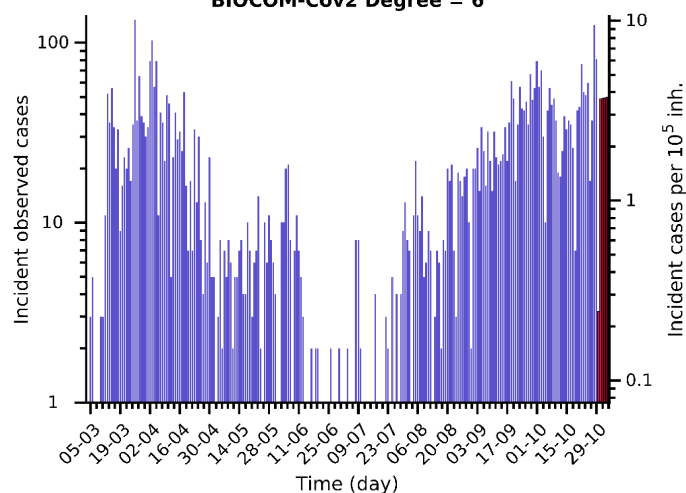
Day	Number of cases	95% Confidence Interval
30-10-2020	4674 (+3)	[4671 - 5364]
01-11-2020	4772 (+49)	[4671 - 5491]
03-11-2020	4872 (+50)	[4671 - 5655]

Current indicators

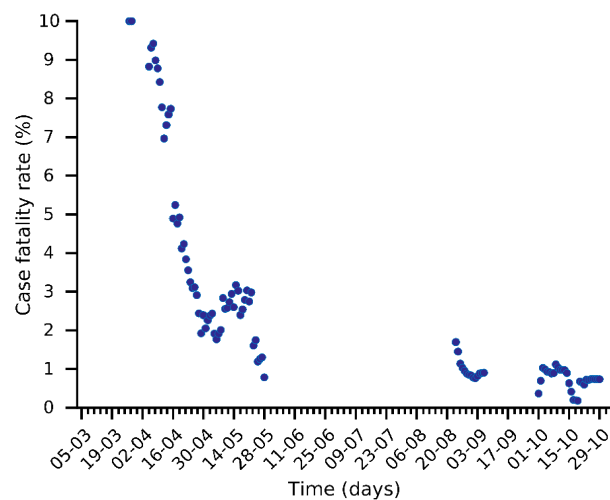
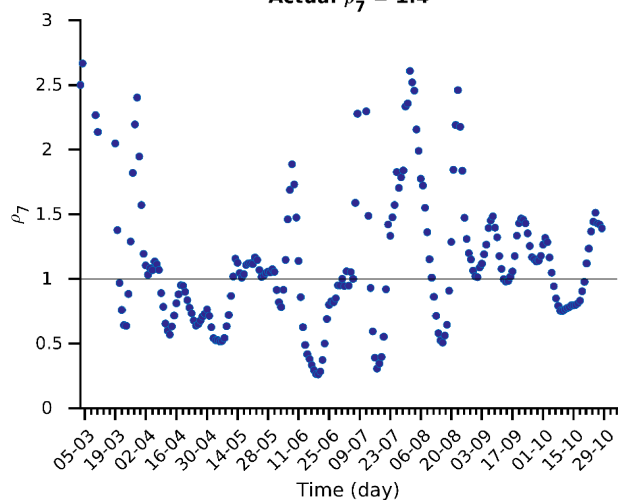
A ₁₄	EPG	CFR
52	72	0.73 %



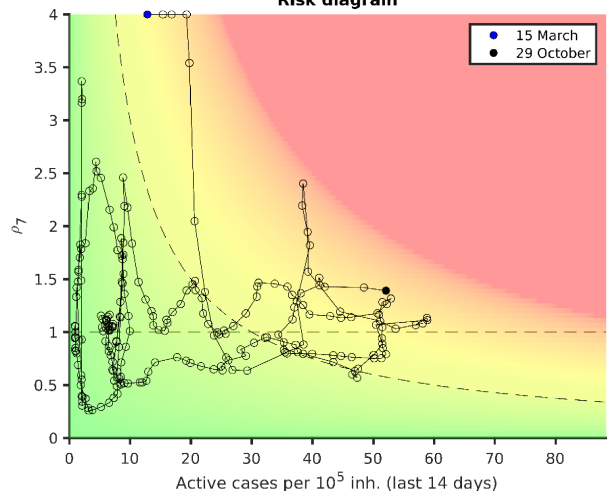
BIOCOM-Cov2 Degree = 6



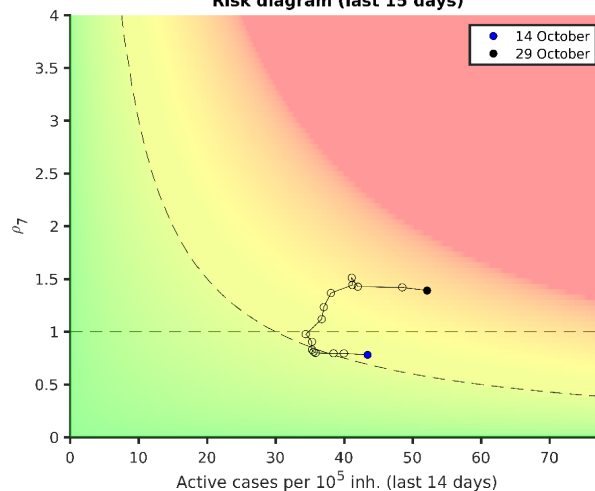
Actual $\rho_7 = 1.4$



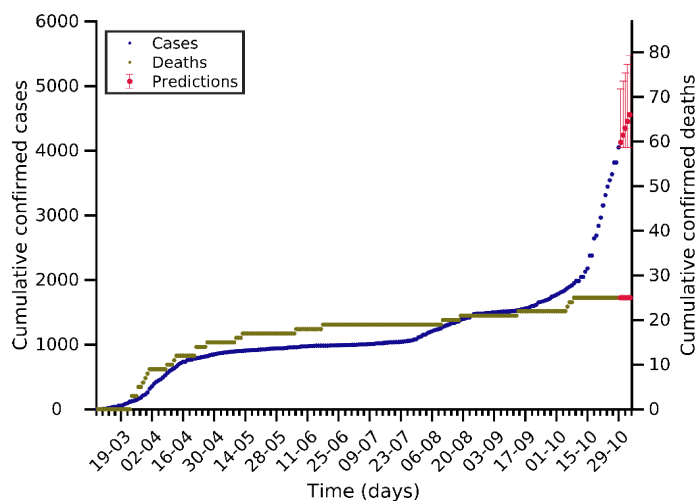
Risk diagram



Risk diagram (last 15 days)



Cyprus 29-10-2020. Pop: 1.2M. Cumulative incidence: 336/10⁵

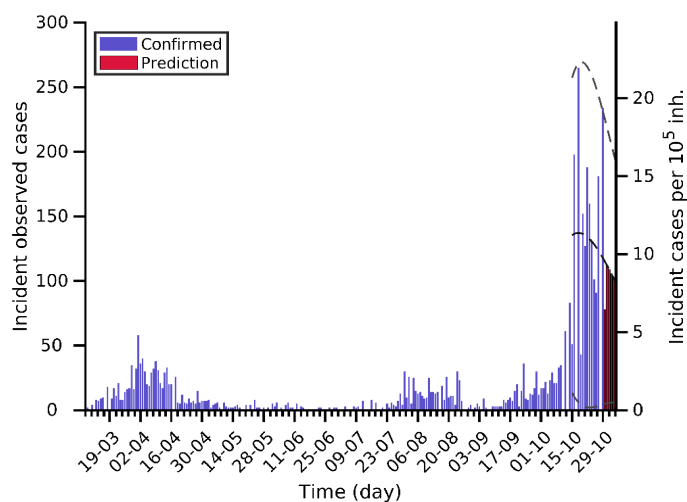


Predictions for next days

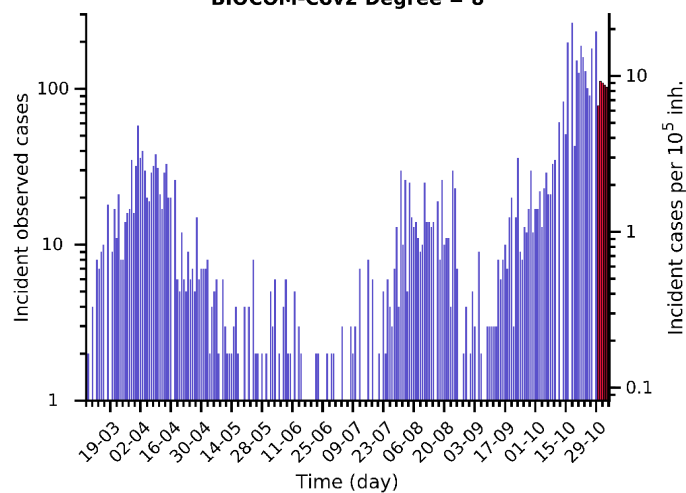
Day	Number of cases	95% Confidence Interval
30-10-2020	4129 (+78)	[4051 - 4955]
01-11-2020	4349 (+109)	[4051 - 5206]
03-11-2020	4557 (+102)	[4051 - 5474]

Current indicators

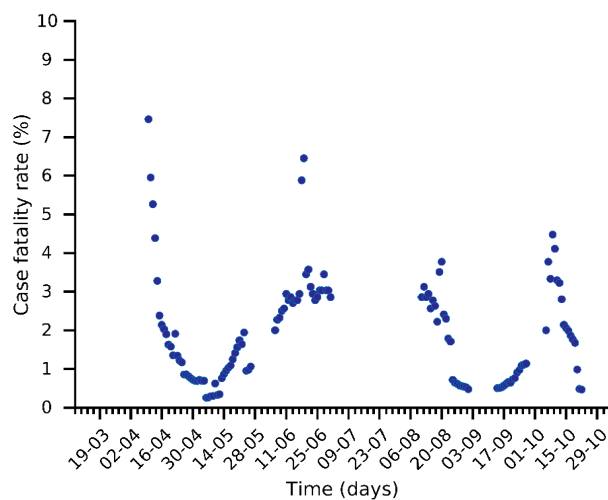
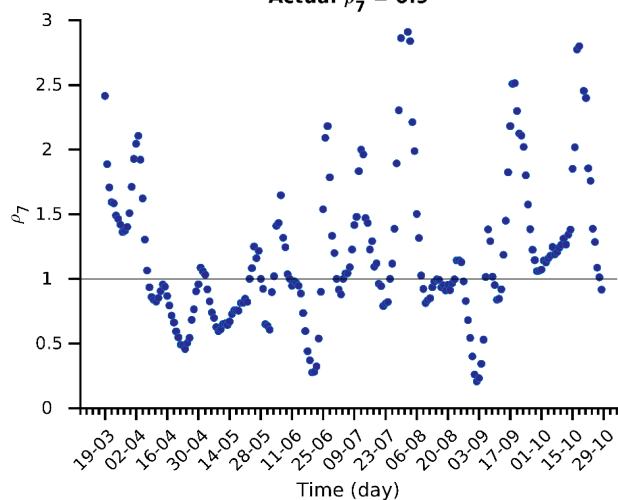
A ₁₄	EPG	CFR
155	142	0.00 %



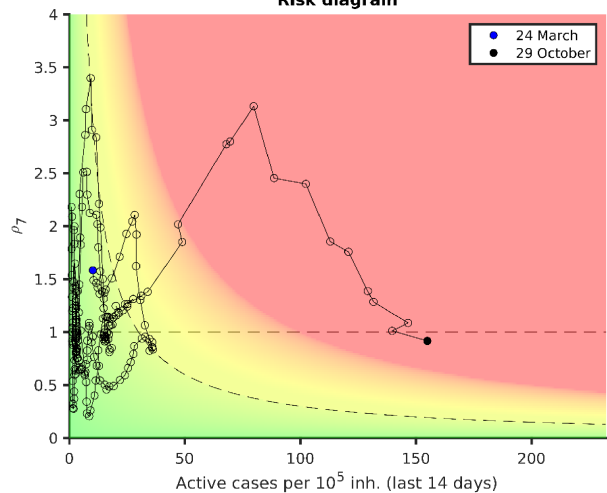
BIOCOM-Cov2 Degree = 8



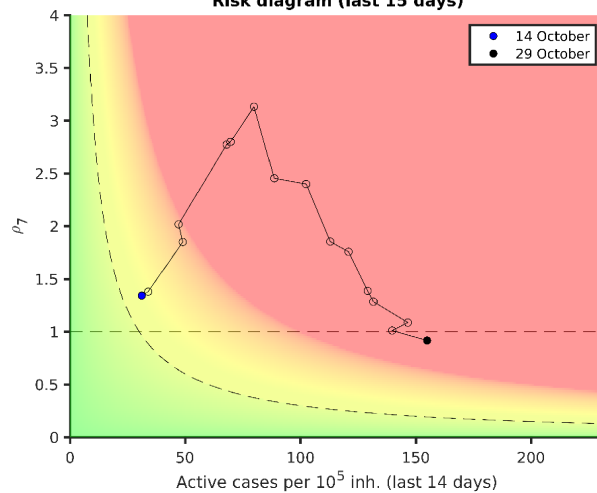
Actual $\rho_7 = 0.9$



Risk diagram

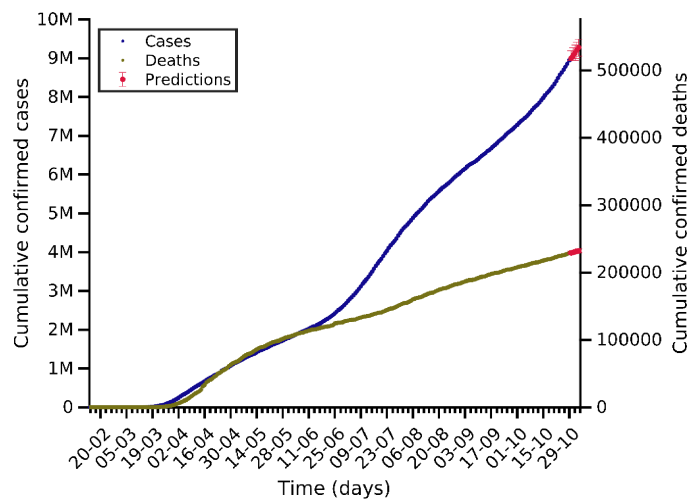


Risk diagram (last 15 days)



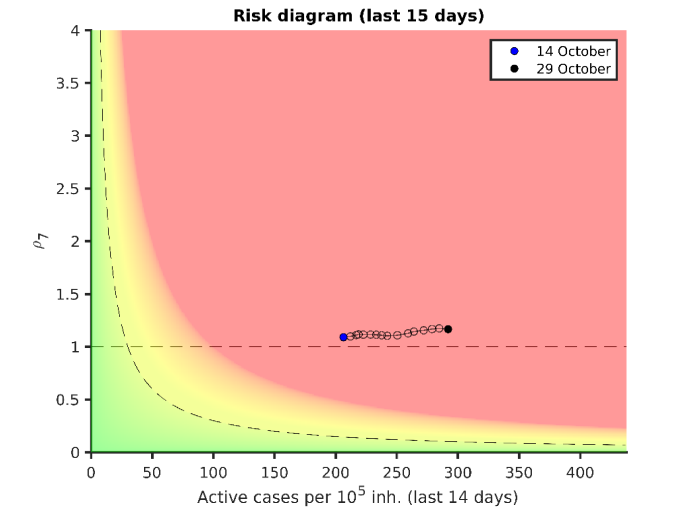
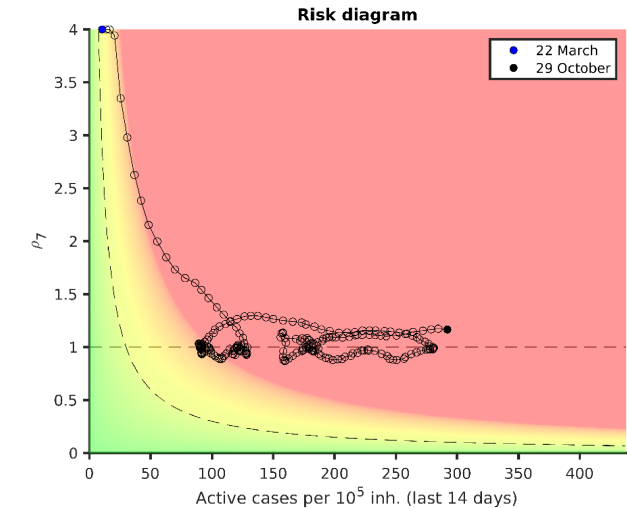
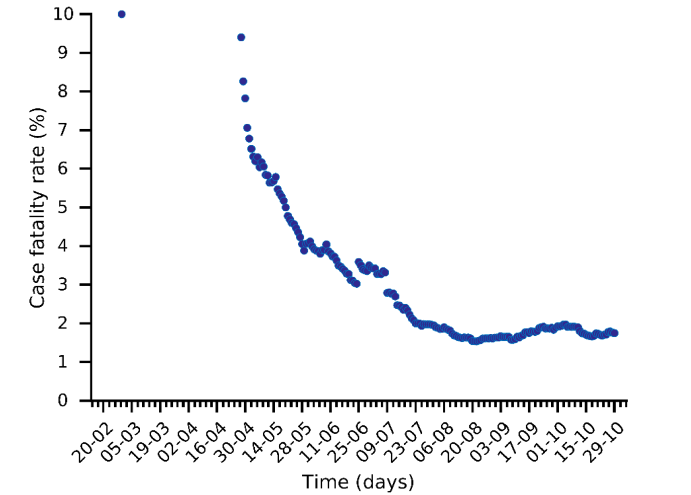
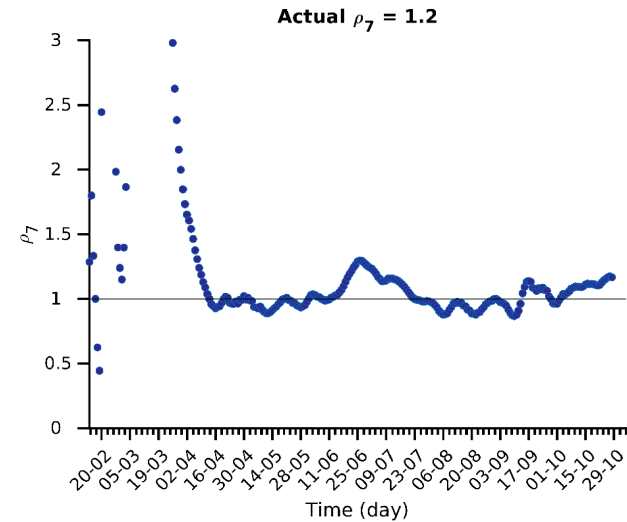
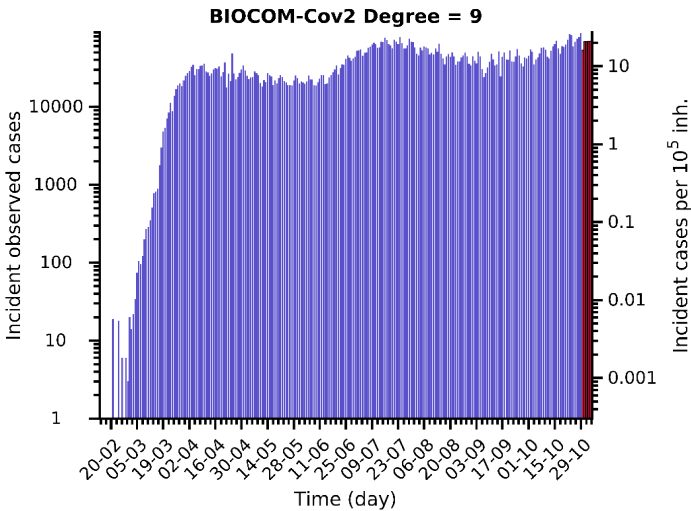
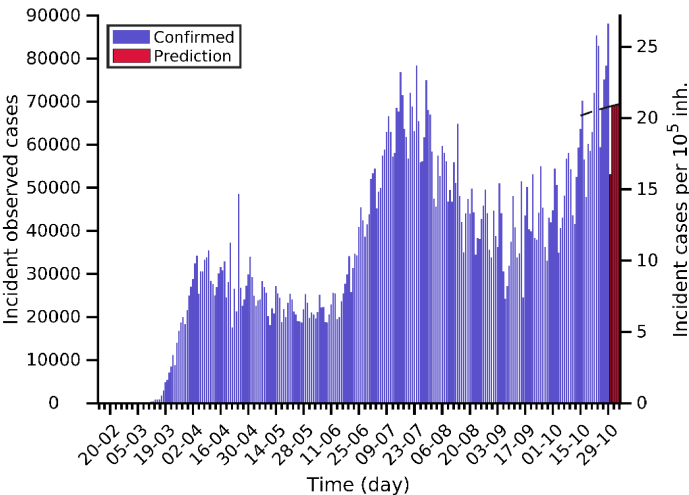
(2) Analysis and prediction of COVID-19 for other countries

USA 29-10-2020. Pop: 331.0M. Cumulative incidence: 2703/10⁵

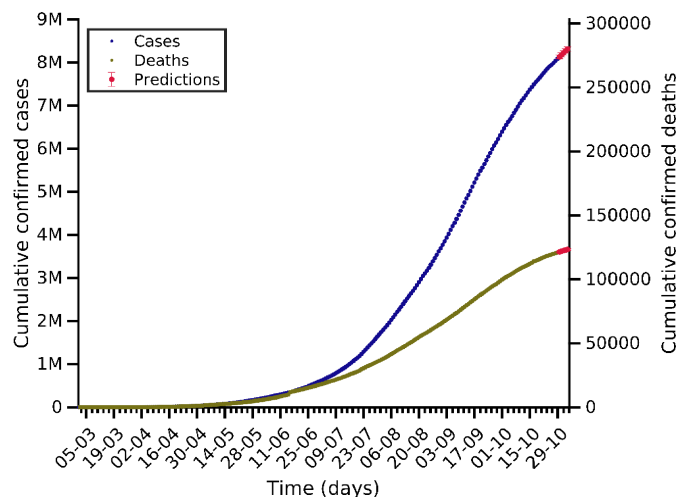


Predictions for next days		
Day	Number of cases	95% Confidence Interval
30-10-2020	8999204 (+53050)	[8946154 - 9194176]
01-11-2020	9137374 (+69144)	[8946154 - 9340195]
03-11-2020	9276002 (+69370)	[9056239 - 9495764]

Current indicators		
A ₁₄	EPG	CFR
292	341	1.75 %



India 29-10-2020. Pop: 1353.0M. Cumulative incidence: 598/10⁵

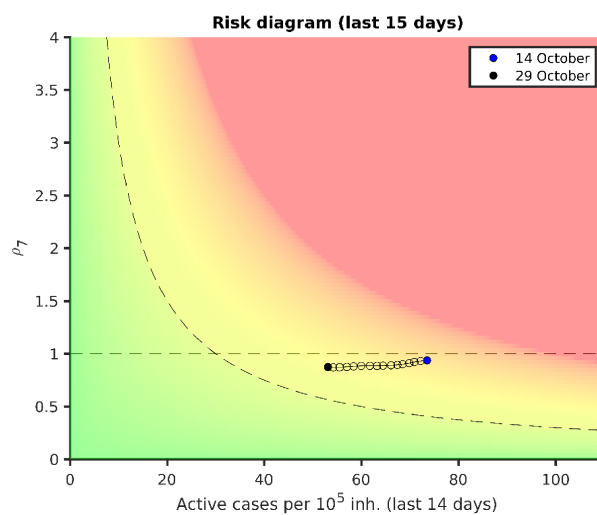
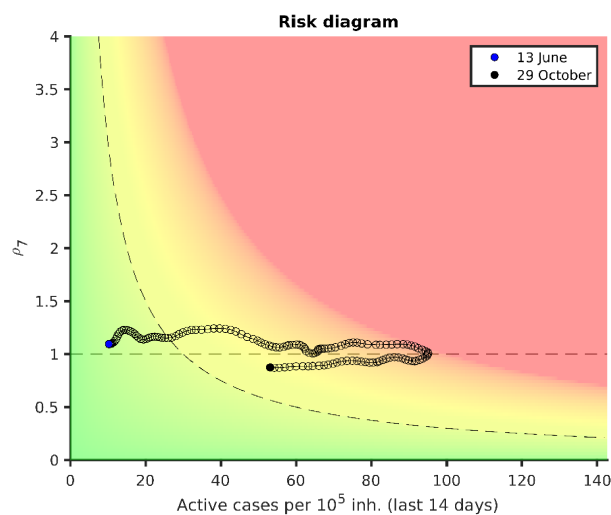
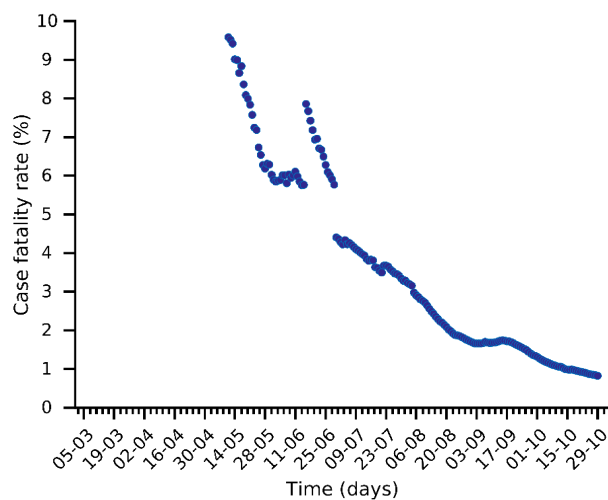
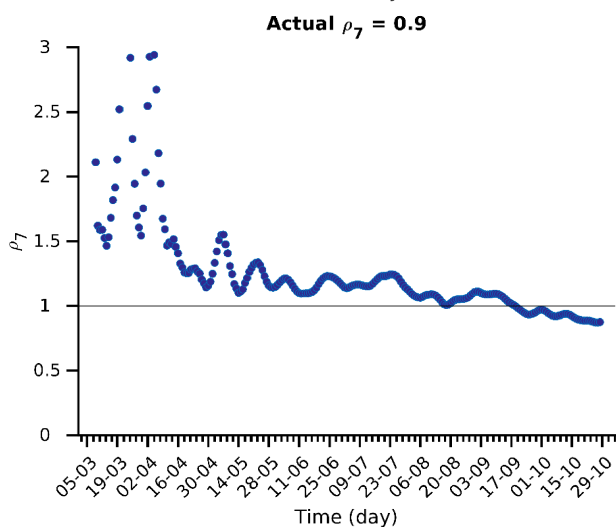
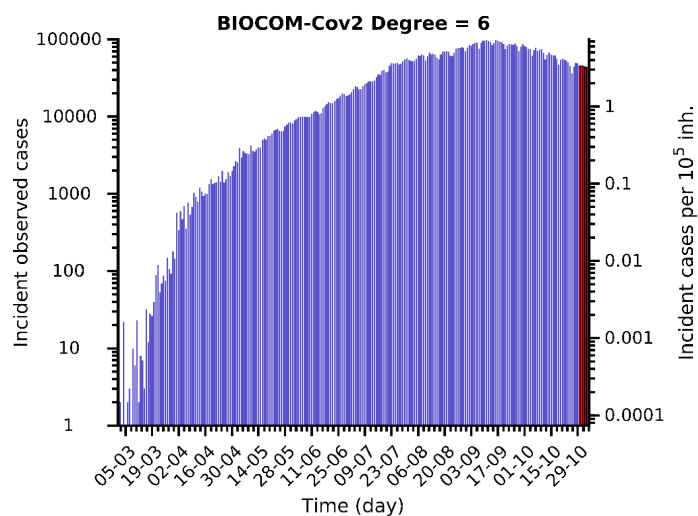
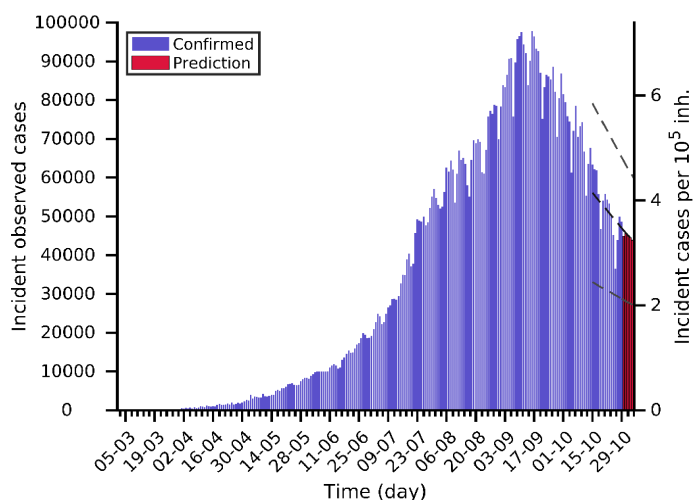


Predictions for next days

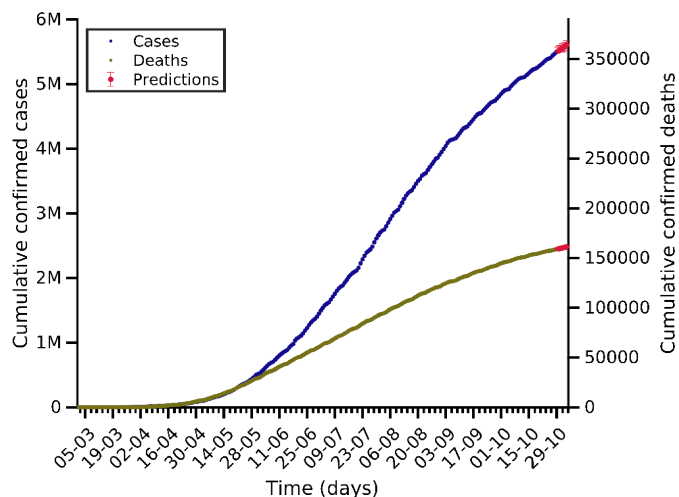
Day	Number of cases	95% Confidence Interval
30-10-2020	8133708 (+44857)	[8088851 - 8178643]
01-11-2020	8224579 (+45123)	[8178048 - 8271111]
03-11-2020	8312964 (+43884)	[8263156 - 8362772]

Current indicators

A ₁₄	EPG	CFR
53	46	0.82 %



Brazil 29-10-2020. Pop: 212.6M. Cumulative incidence: 2585/10⁵

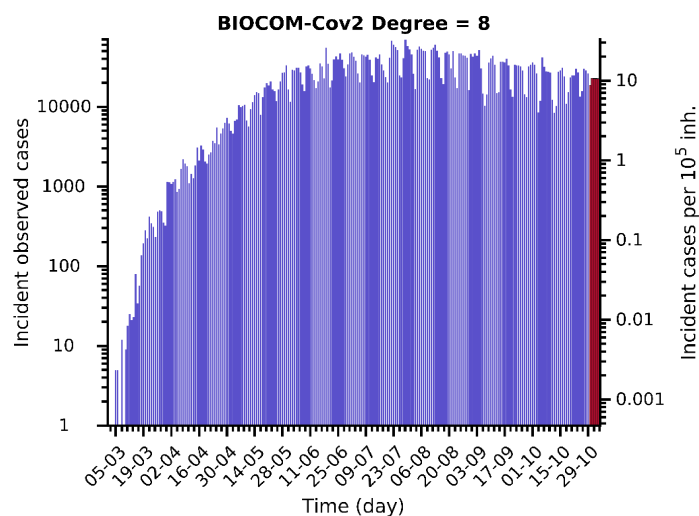
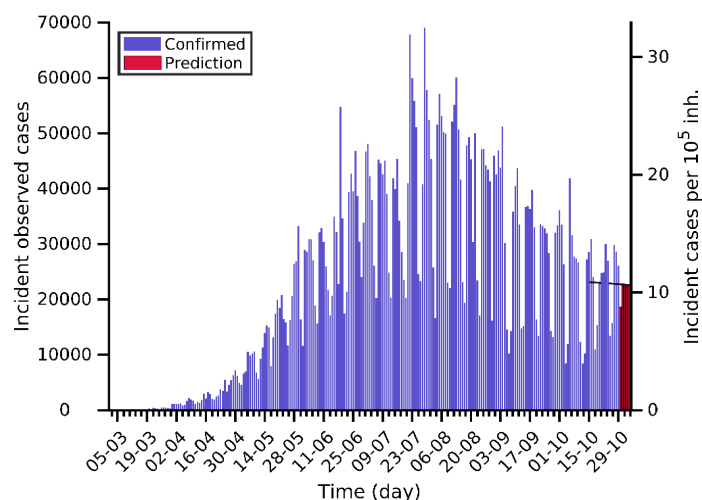


Predictions for next days

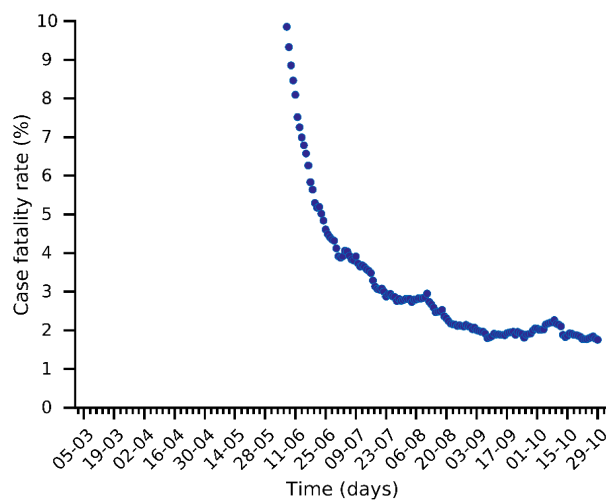
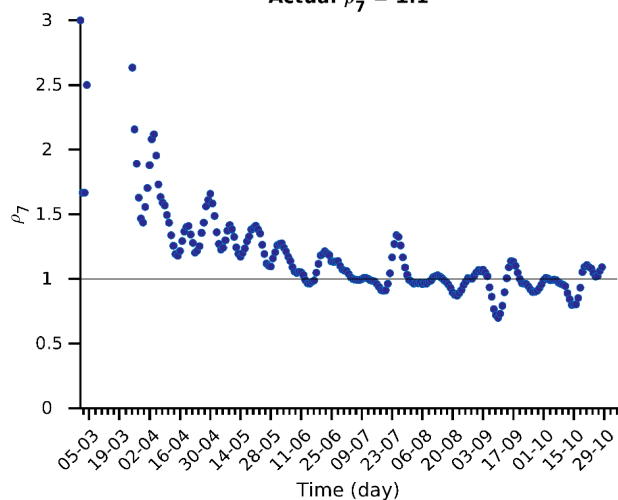
Day	Number of cases	95% Confidence Interval
30-10-2020	5513023 (+18647)	[5494376 - 5572985]
01-11-2020	5558381 (+22664)	[5496094 - 5620669]
03-11-2020	5603619 (+22604)	[5536384 - 5670854]

Current indicators

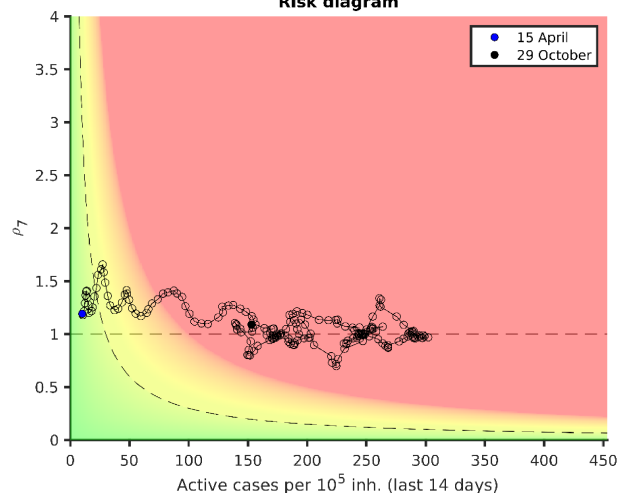
A ₁₄	EPG	CFR
153	167	1.76 %



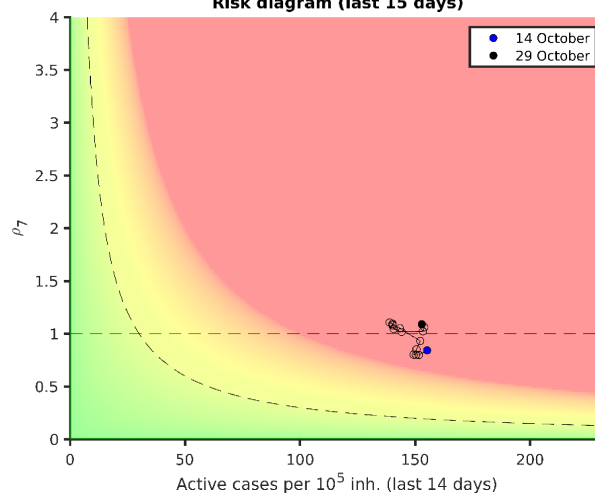
Actual $\rho_7 = 1.1$



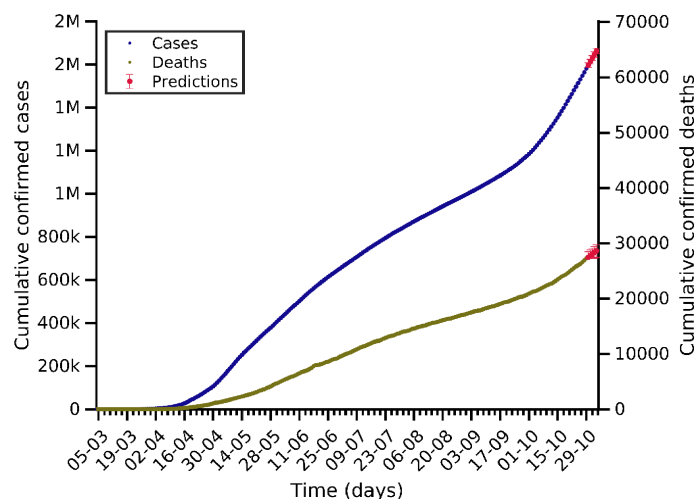
Risk diagram



Risk diagram (last 15 days)



Russia 29-10-2020. Pop: 145.9M. Cumulative incidence: 1084/10⁵

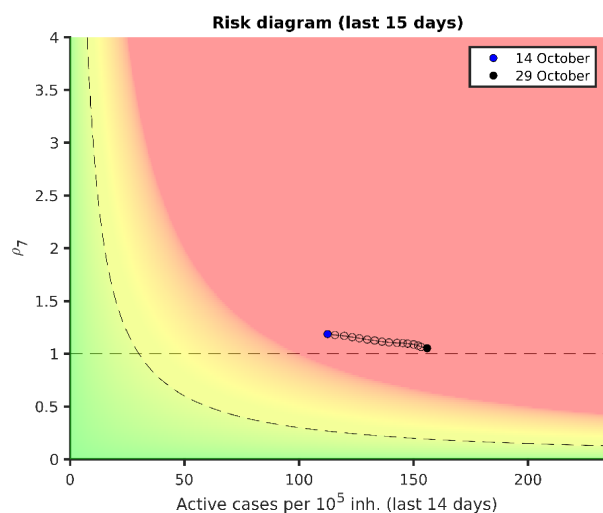
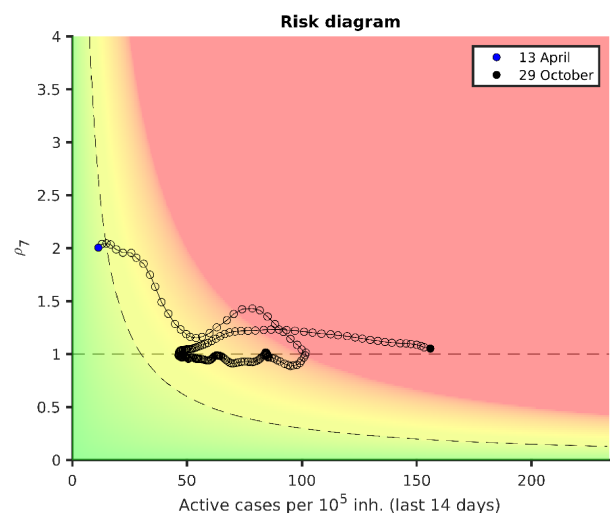
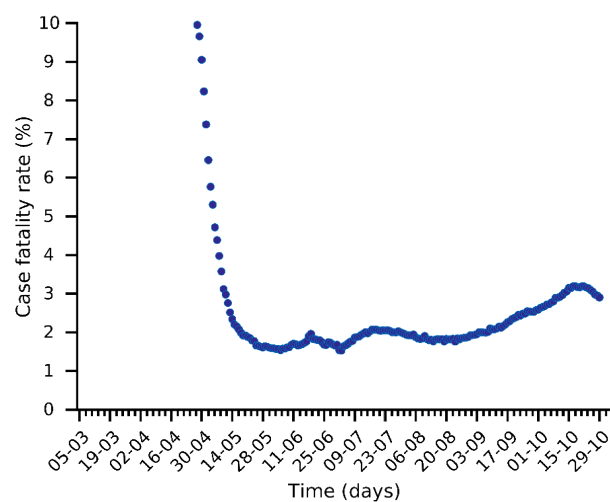
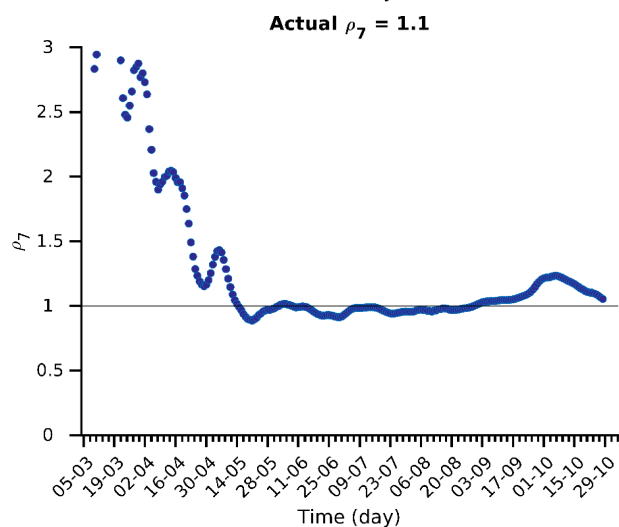
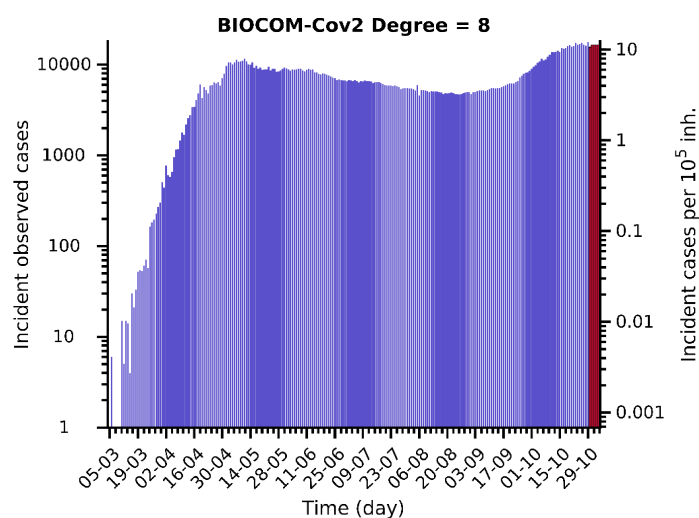
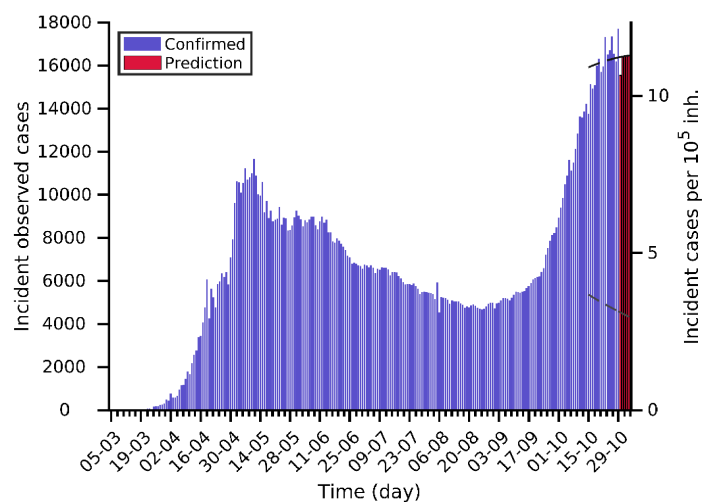


Predictions for next days

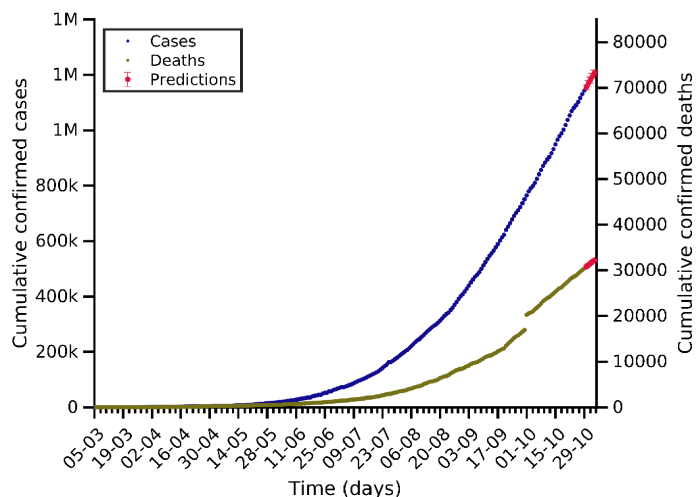
Day	Number of cases	95% Confidence Interval
30-10-2020	1597238 (+15545)	[1586222 - 1608253]
01-11-2020	1630094 (+16437)	[1618632 - 1641556]
03-11-2020	1663017 (+16469)	[1650591 - 1675443]

Current indicators

A ₁₄	EPG	CFR
156	164	2.90 %



Argentina 29-10-2020. Pop: 45.2M. Cumulative incidence: 2529/10⁵

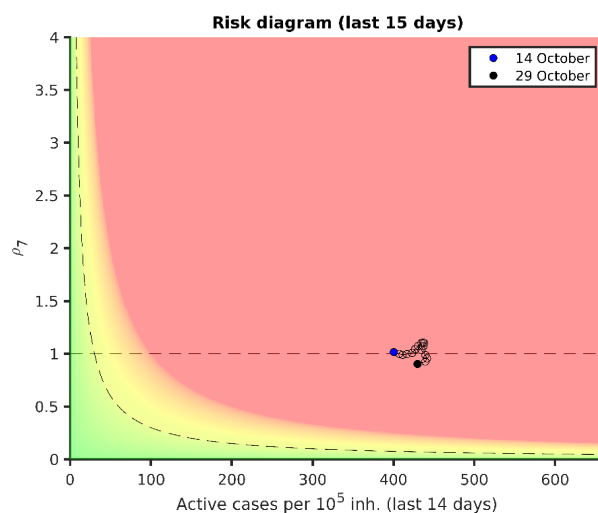
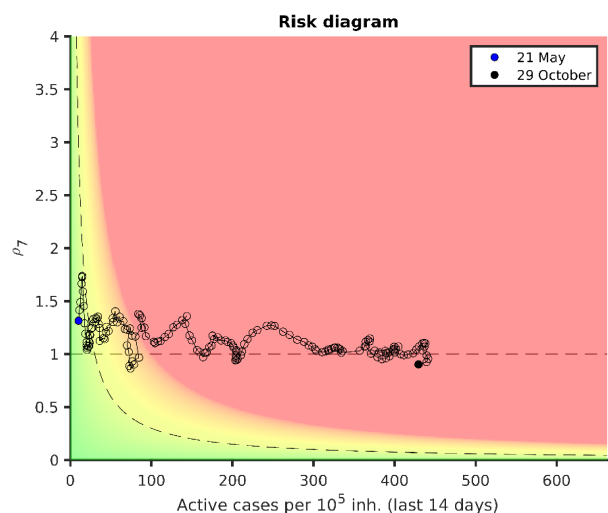
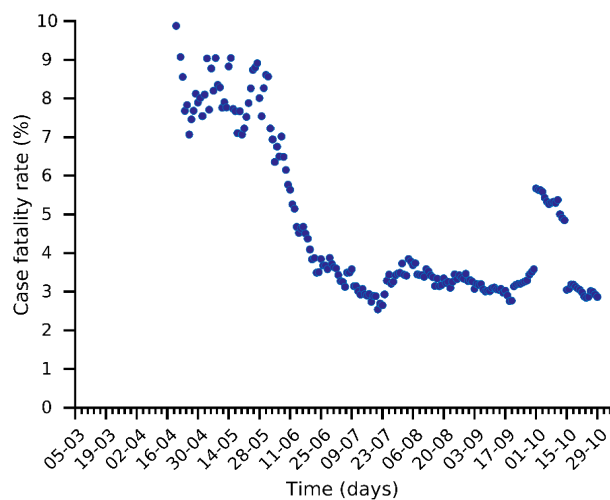
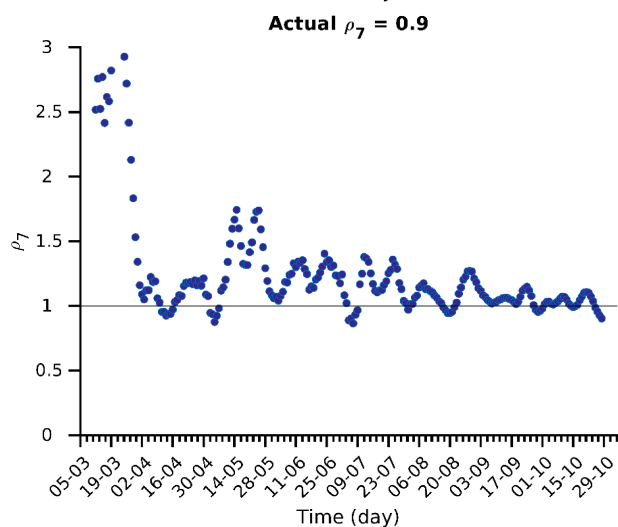
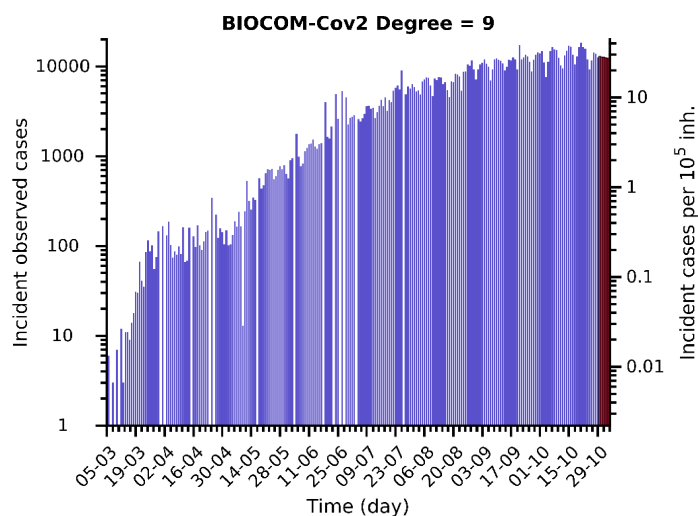
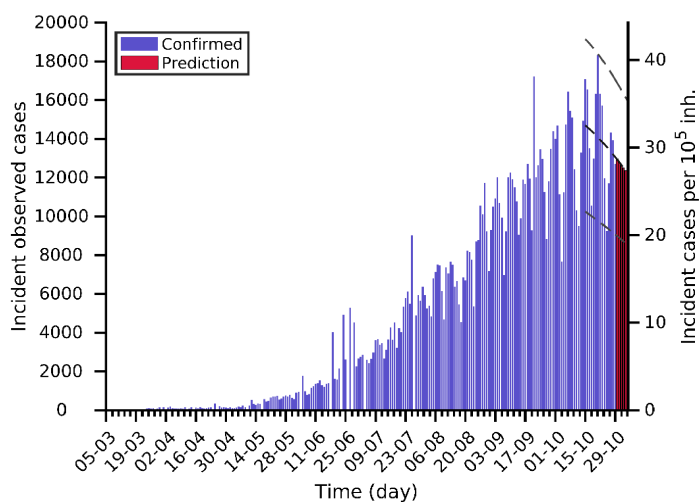


Predictions for next days

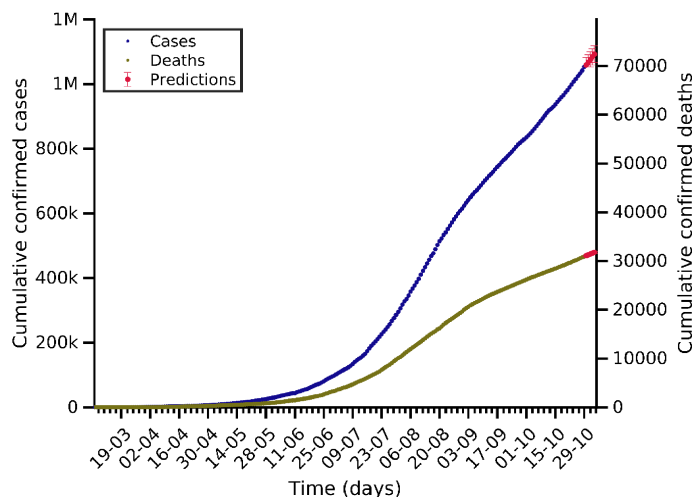
Day	Number of cases	95% Confidence Interval
30-10-2020	1156176 (+12965)	[1145716 - 1166635]
01-11-2020	1181611 (+12648)	[1170762 - 1192461]
03-11-2020	1206482 (+12364)	[1194821 - 1218144]

Current indicators

A ₁₄	EPG	CFR
430	388	2.86 %



Colombia 29-10-2020. Pop: 50.9M. Cumulative incidence: 2070/10⁵

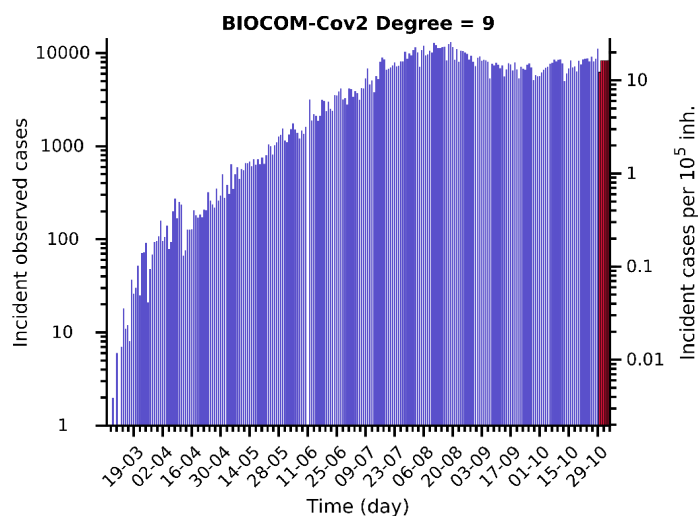
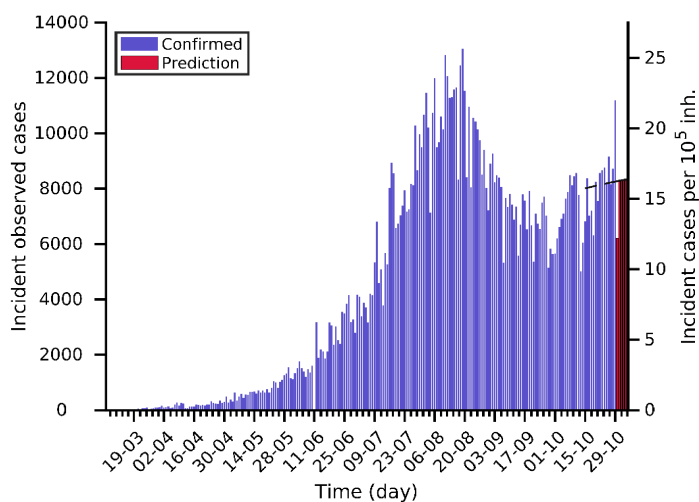


Predictions for next days

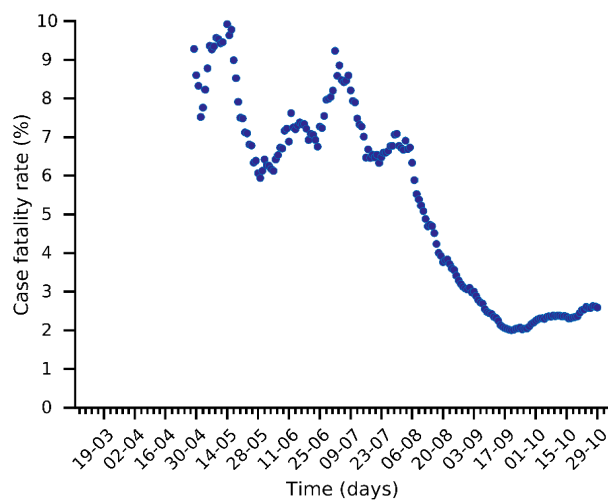
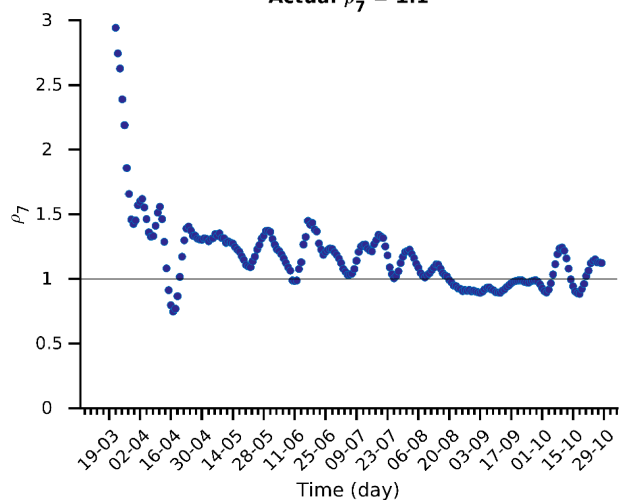
Day	Number of cases	95% Confidence Interval
30-10-2020	1059328 (+6206)	[1053122 - 1082458]
01-11-2020	1075917 (+8302)	[1053122 - 1099979]
03-11-2020	1092561 (+8329)	[1066488 - 1118635]

Current indicators

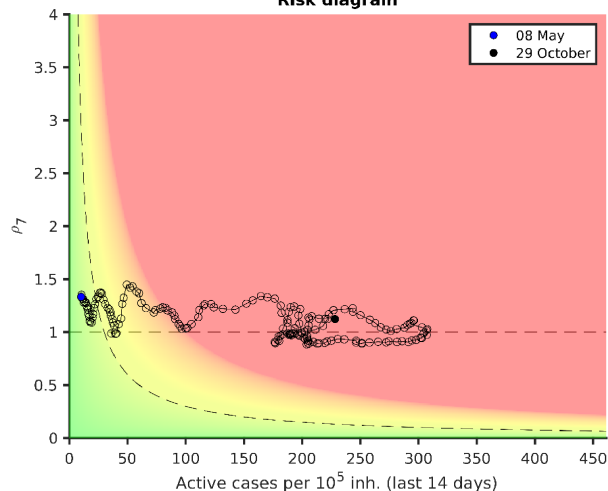
A ₁₄	EPG	CFR
228	256	2.59 %



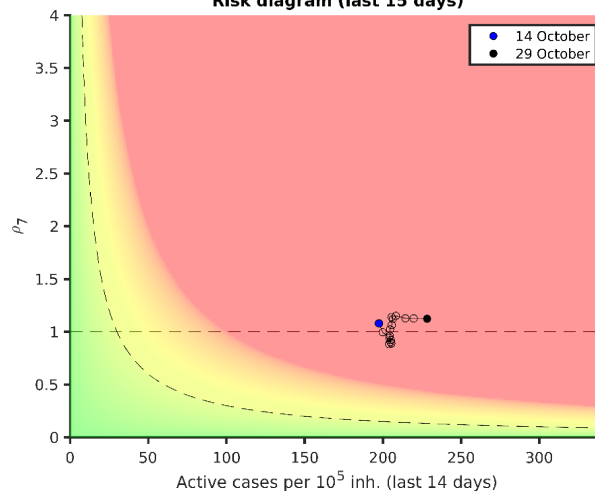
Actual $\rho_7 = 1.1$



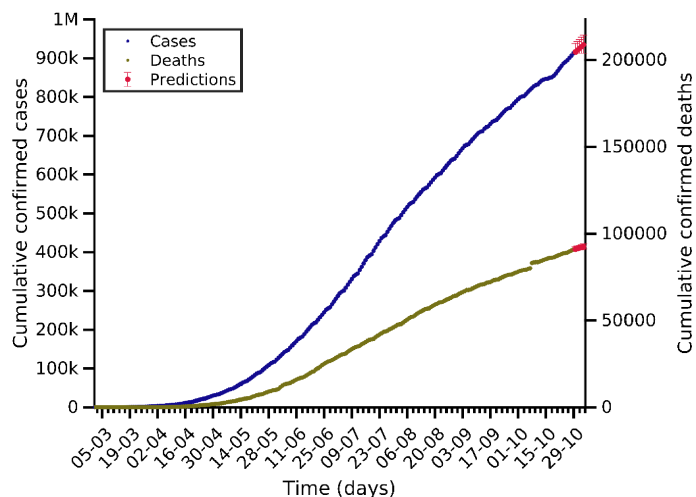
Risk diagram



Risk diagram (last 15 days)



Mexico 29-10-2020. Pop: 128.9M. Cumulative incidence: 708/10⁵

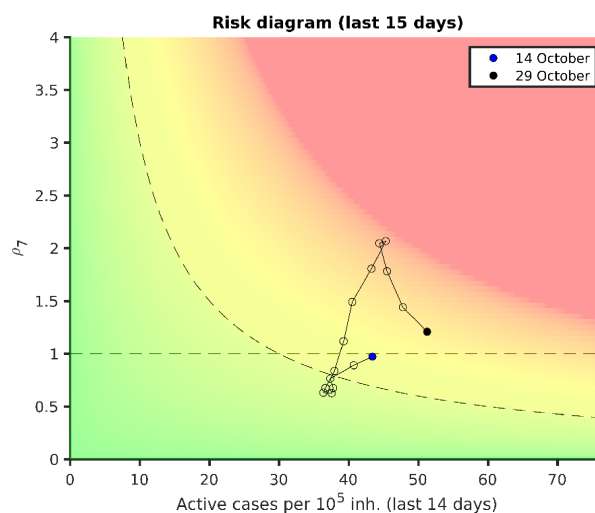
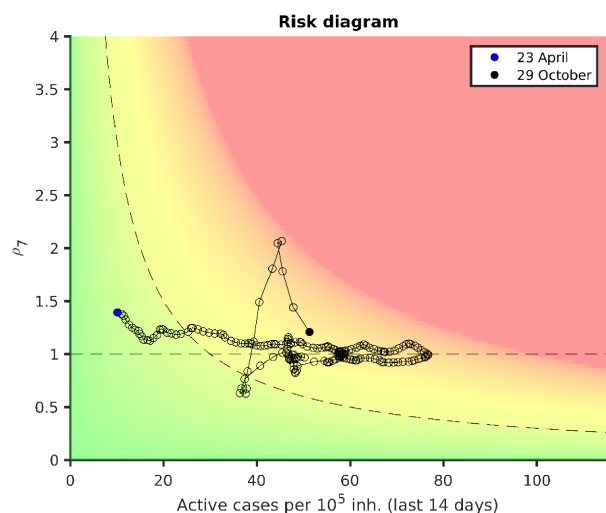
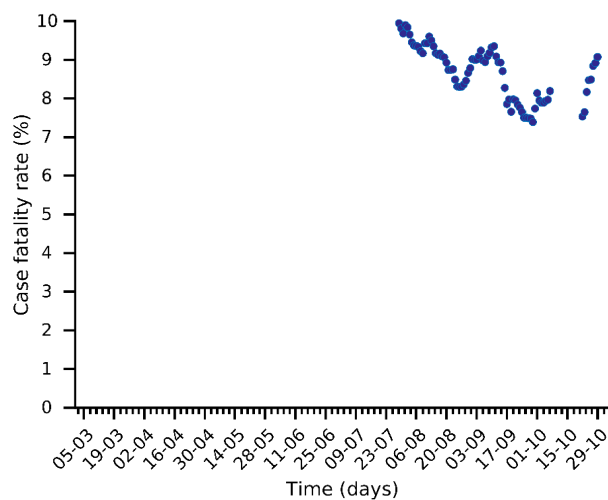
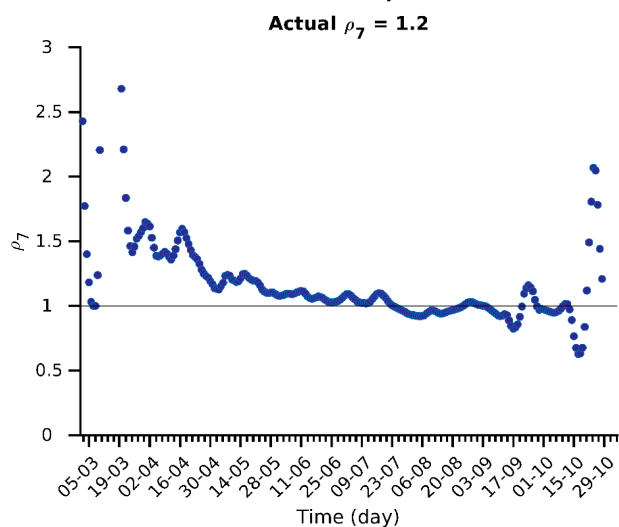
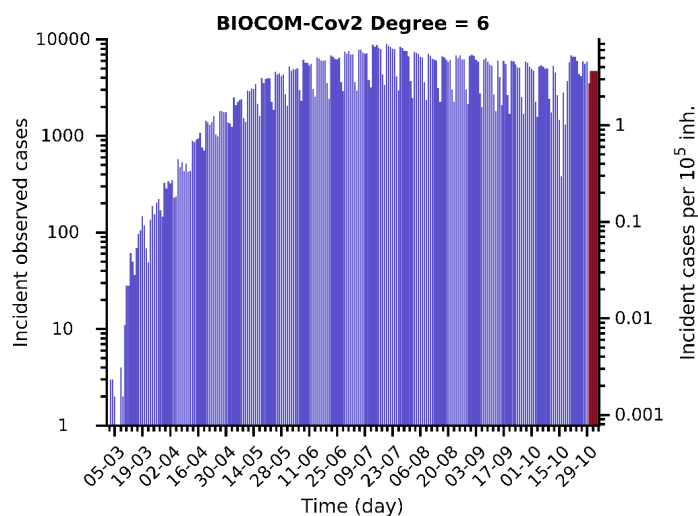
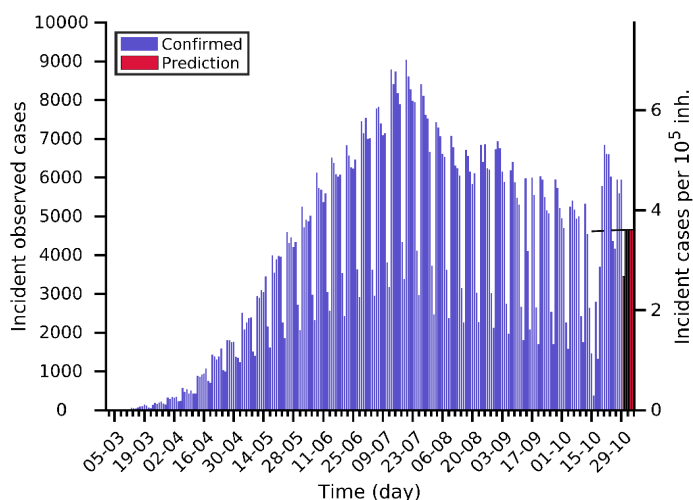


Predictions for next days

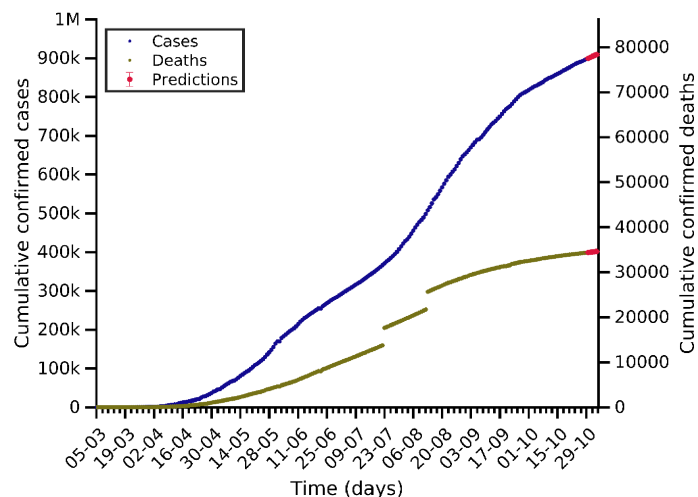
Day	Number of cases	95% Confidence Interval
30-10-2020	916262 (+3451)	[912811 - 938262]
01-11-2020	925570 (+4655)	[912811 - 948438]
03-11-2020	934885 (+4658)	[912811 - 959609]

Current indicators

A ₁₄	EPG	CFR
51	62	9.07 %



Peru 29-10-2020. Pop: 33.0M. Cumulative incidence: 2722/10⁵

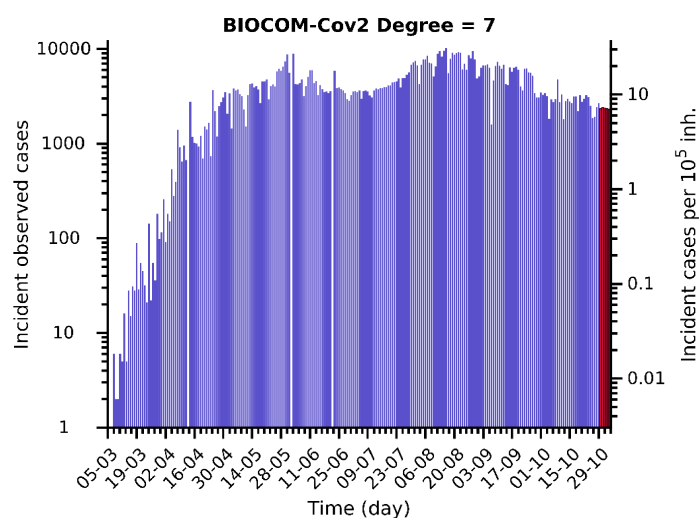
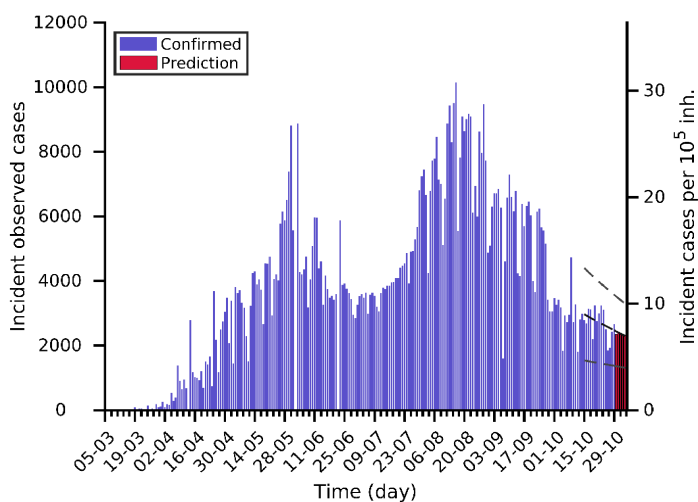


Predictions for next days

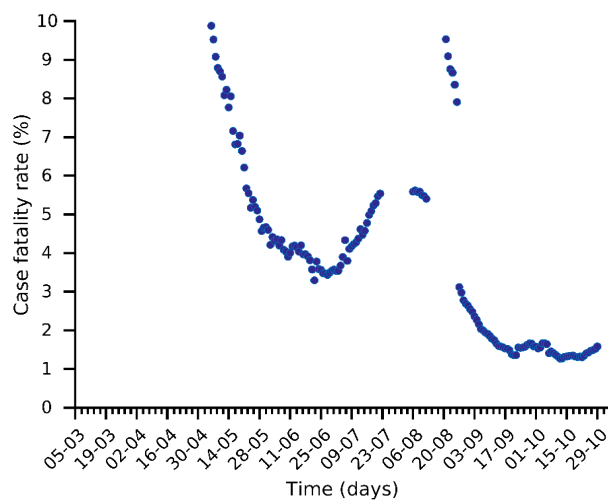
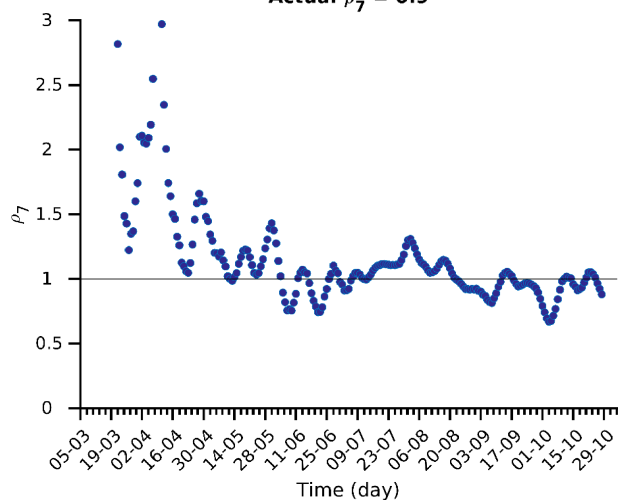
Day	Number of cases	95% Confidence Interval
30-10-2020	899942 (+2348)	[897656 - 902229]
01-11-2020	904723 (+2374)	[902355 - 907090]
03-11-2020	909375 (+2310)	[906843 - 911906]

Current indicators

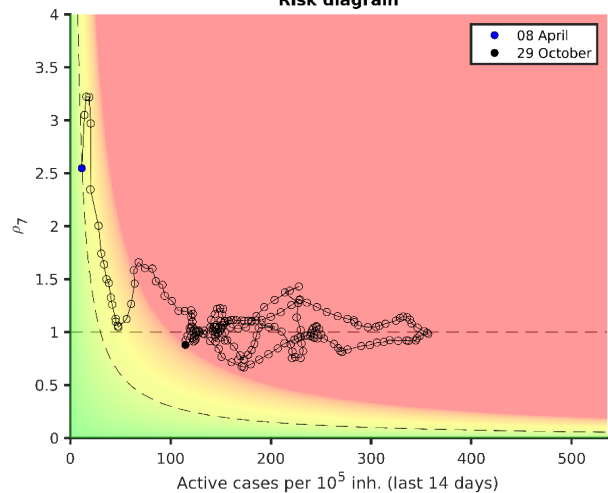
A ₁₄	EPG	CFR
115	101	1.58 %



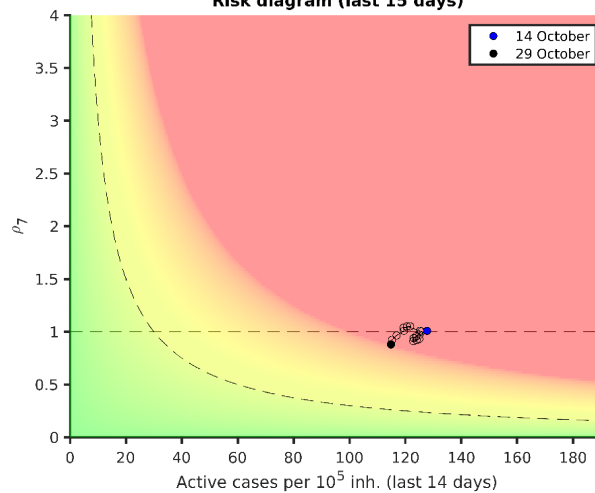
Actual $\rho_7 = 0.9$



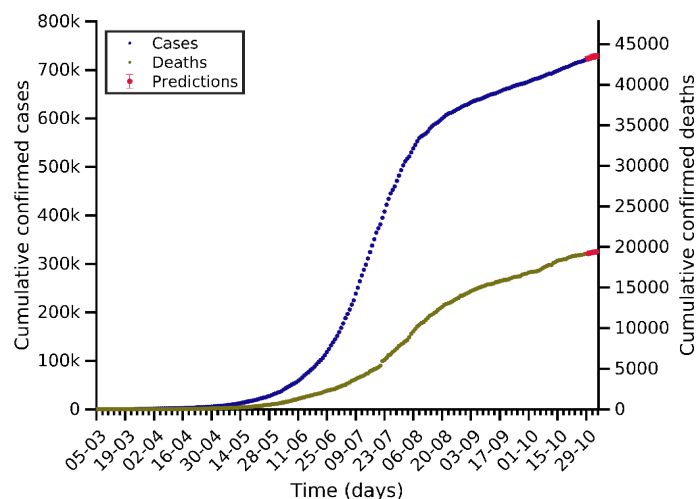
Risk diagram



Risk diagram (last 15 days)



South Africa 29-10-2020. Pop: 59.3M. Cumulative incidence: 1217/10⁵

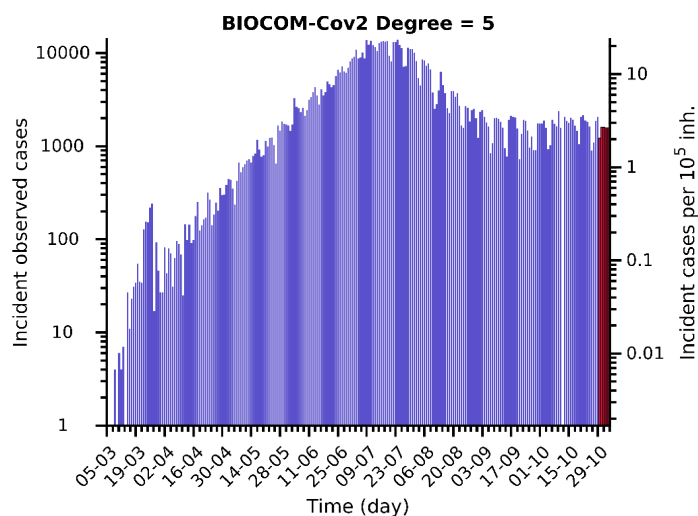
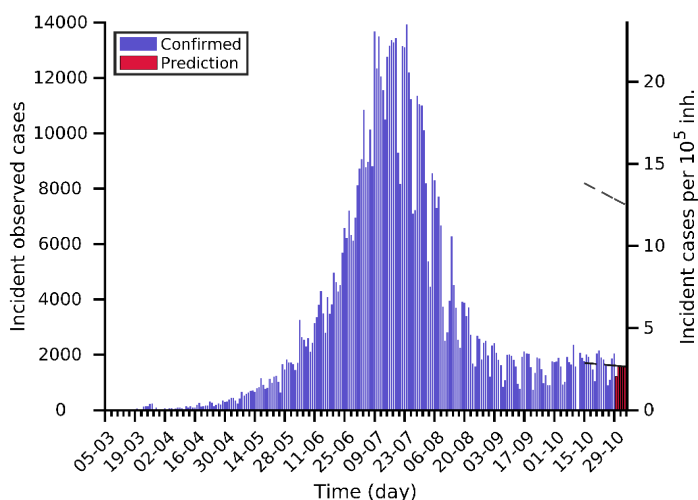


Predictions for next days

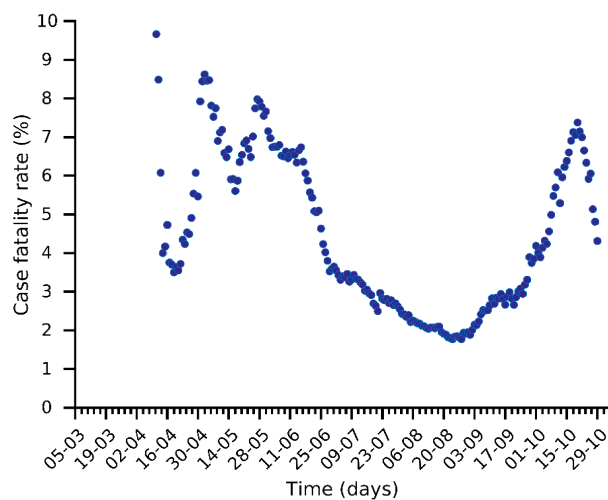
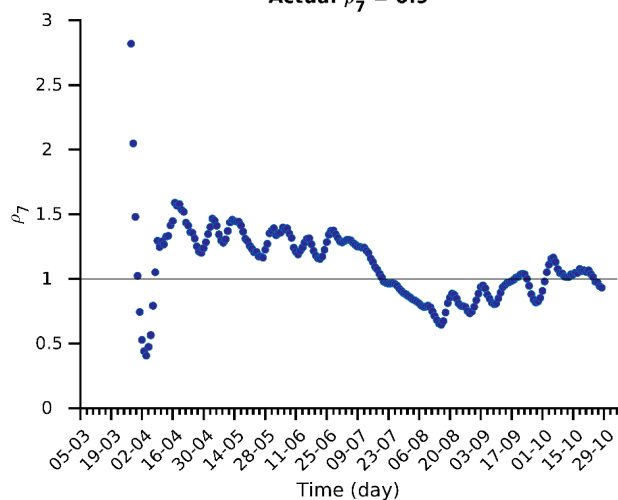
Day	Number of cases	95% Confidence Interval
30-10-2020	722993 (+1223)	[721770 - 727475]
01-11-2020	726181 (+1591)	[721770 - 730833]
03-11-2020	729342 (+1577)	[724337 - 734347]

Current indicators

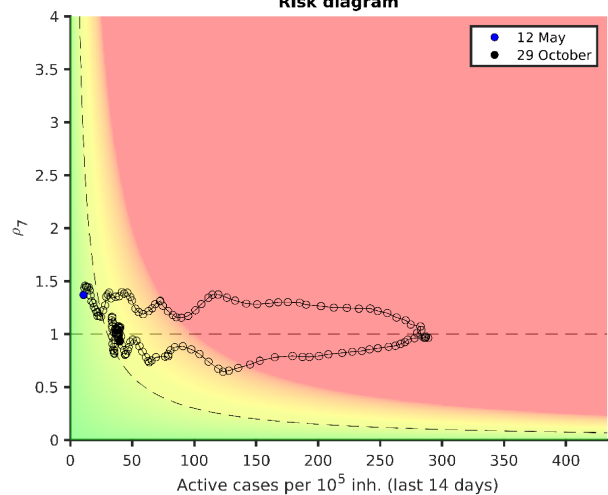
A ₁₄	EPG	CFR
40	37	4.31 %



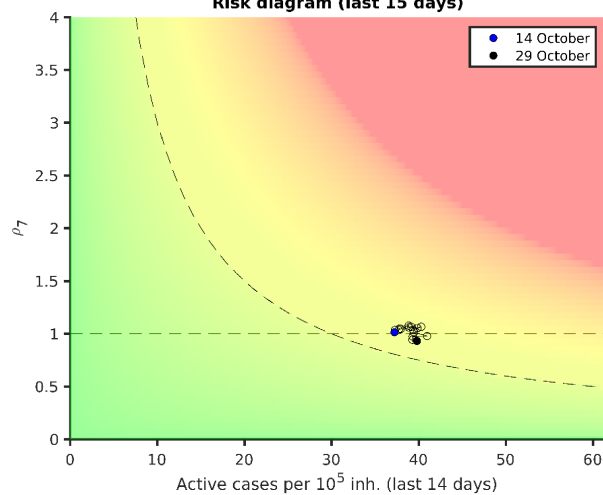
Actual $\rho_7 = 0.9$



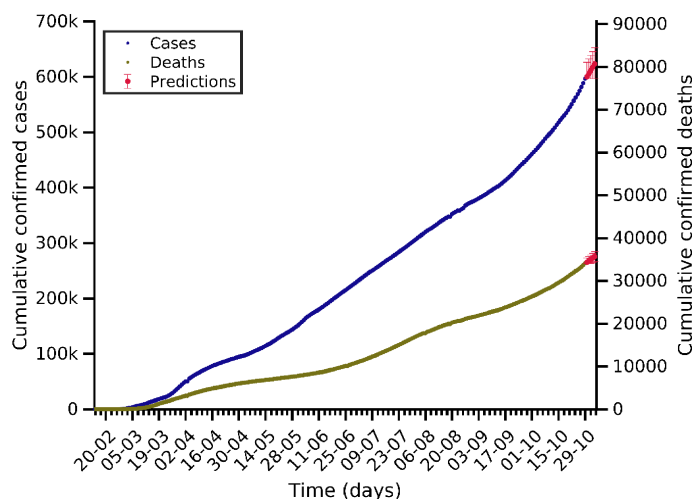
Risk diagram



Risk diagram (last 15 days)



Iran 29-10-2020. Pop: 84.0M. Cumulative incidence: 711/10⁵

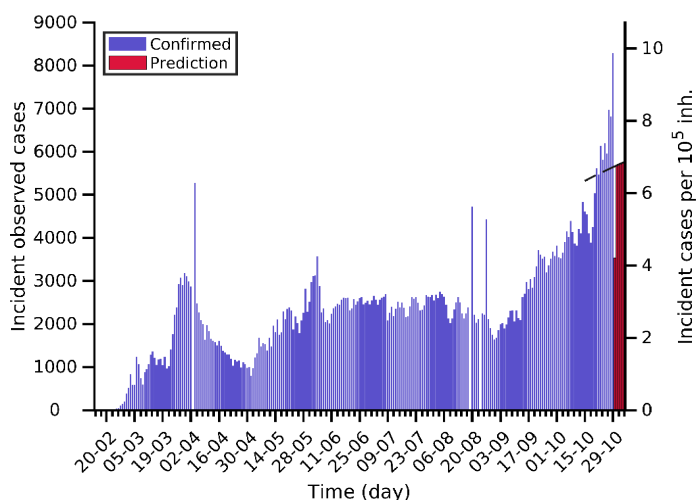


Predictions for next days

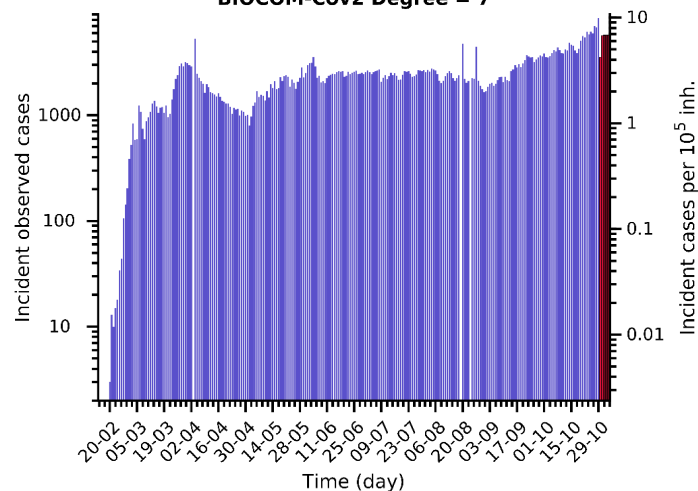
Day	Number of cases	95% Confidence Interval
30-10-2020	600474 (+3533)	[596941 - 626537]
01-11-2020	611867 (+5707)	[596941 - 639002]
03-11-2020	623342 (+5748)	[596941 - 652810]

Current indicators

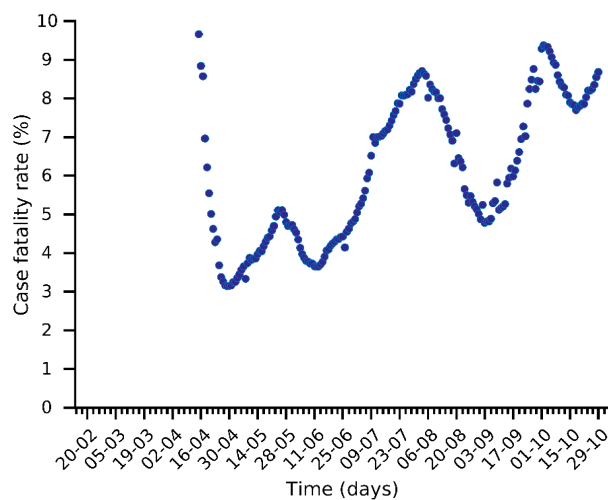
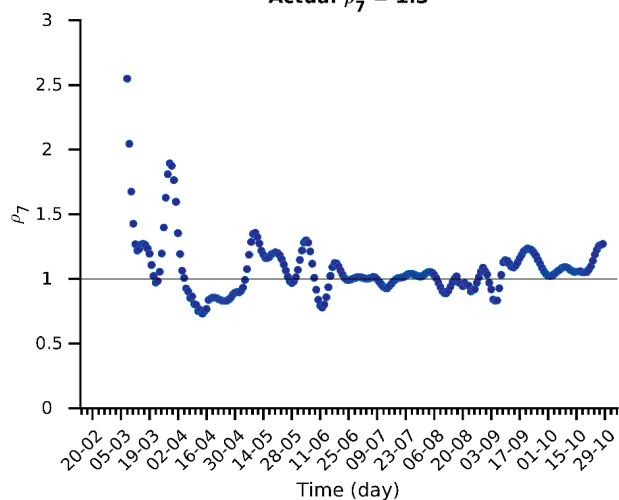
A ₁₄	EPG	CFR
94	120	8.68 %



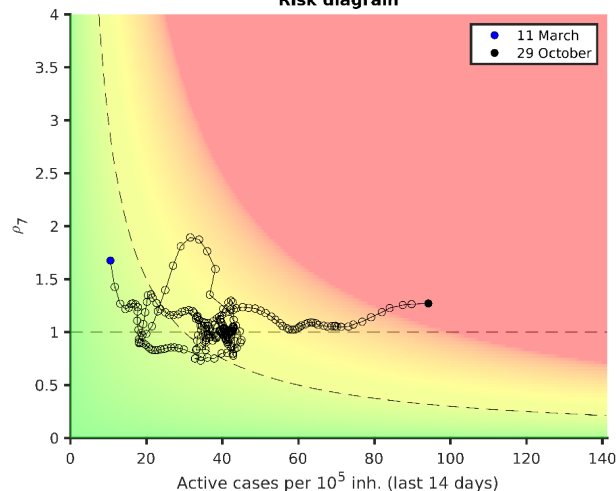
BIOCOM-Cov2 Degree = 7



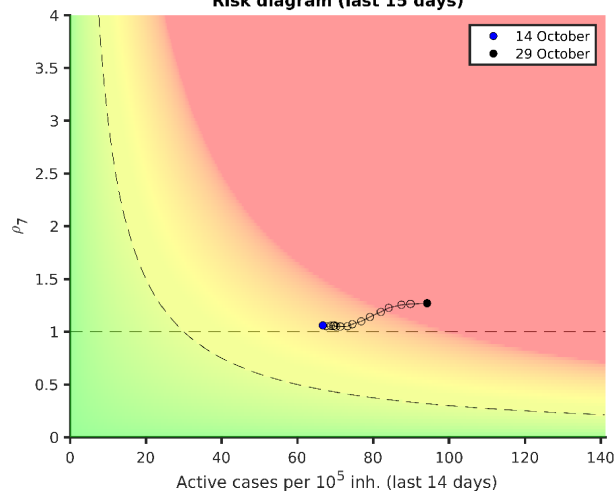
Actual $\rho_7 = 1.3$



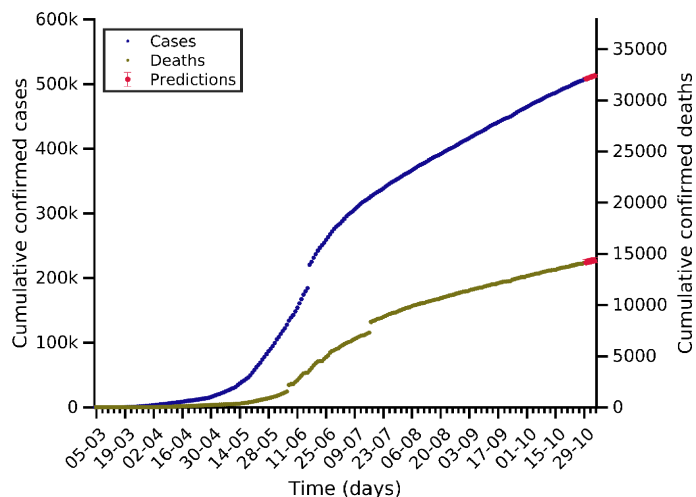
Risk diagram



Risk diagram (last 15 days)



Chile 29-10-2020. Pop: 19.1M. Cumulative incidence: 2652/10⁵

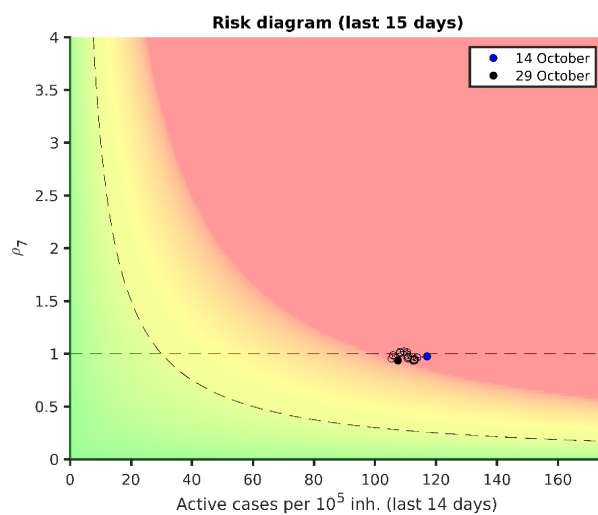
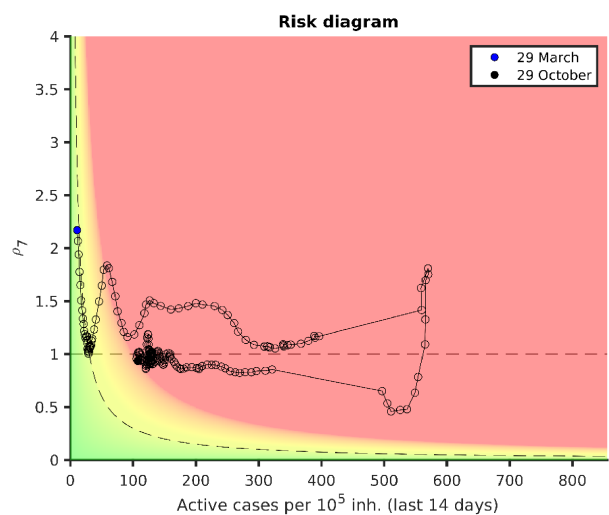
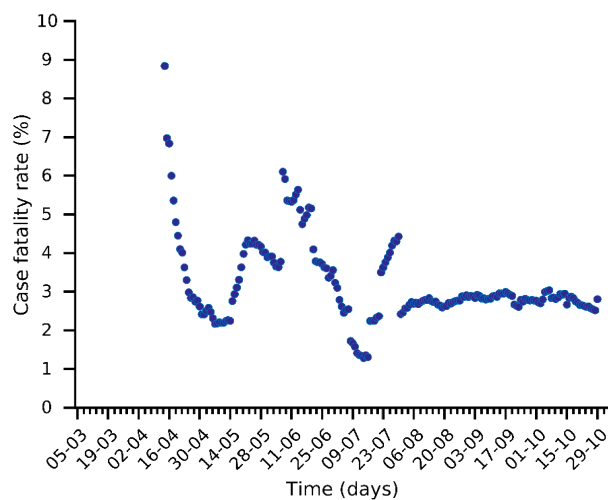
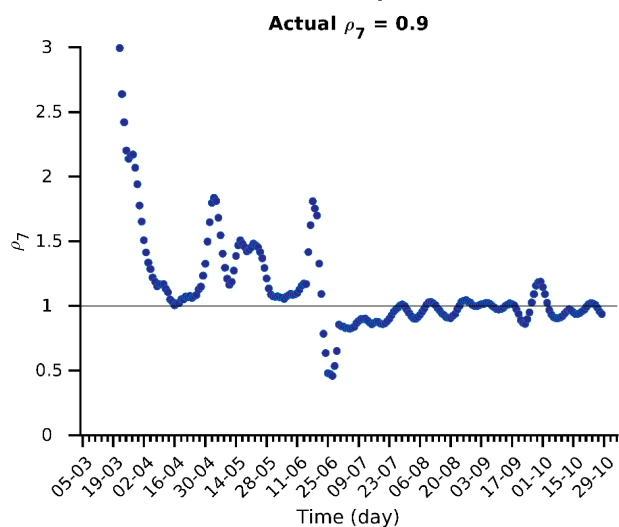
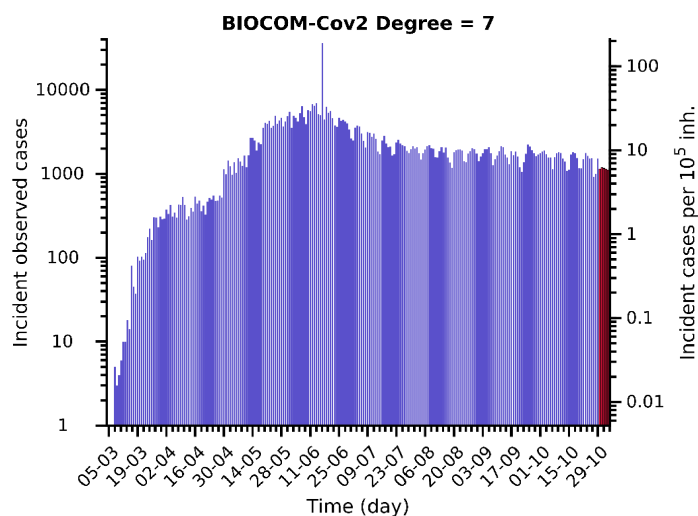
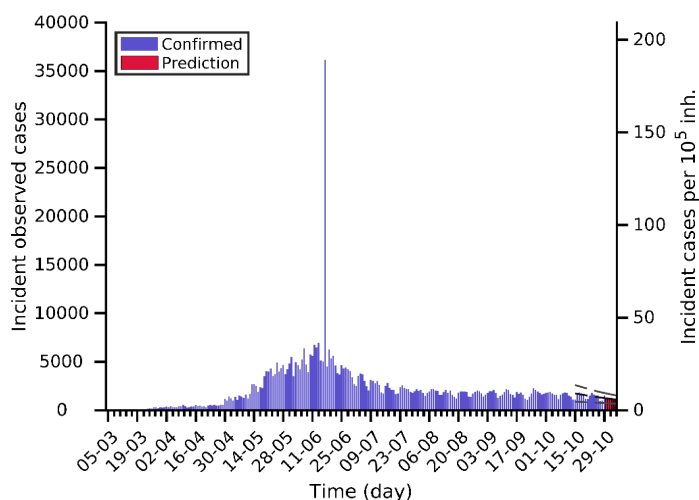


Predictions for next days

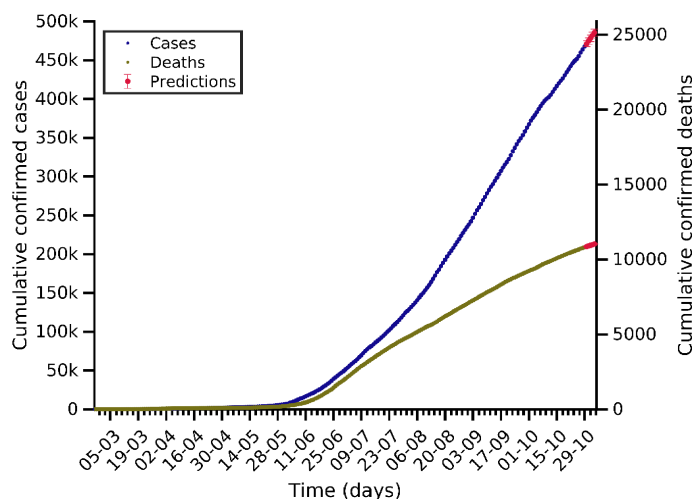
Day	Number of cases	95% Confidence Interval
30-10-2020	508187 (+1137)	[507050 - 510233]
01-11-2020	510548 (+1166)	[508436 - 512660]
03-11-2020	512799 (+1112)	[510556 - 515042]

Current indicators

A ₁₄	EPG	CFR
108	101	2.81 %



Iraq 29-10-2020. Pop: 40.2M. Cumulative incidence: 1163/10⁵

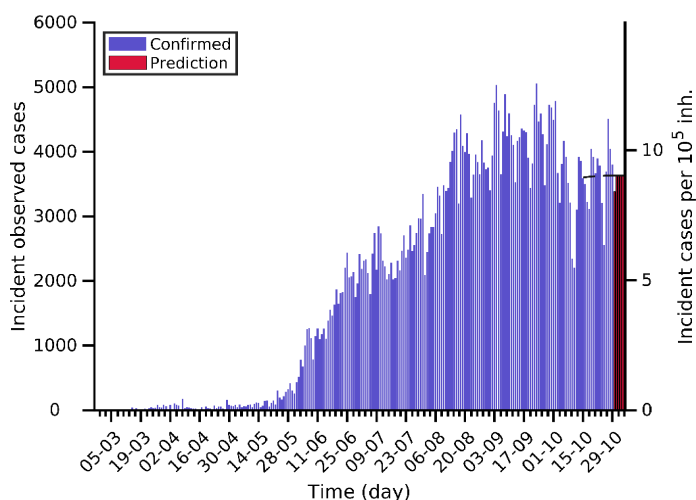


Predictions for next days

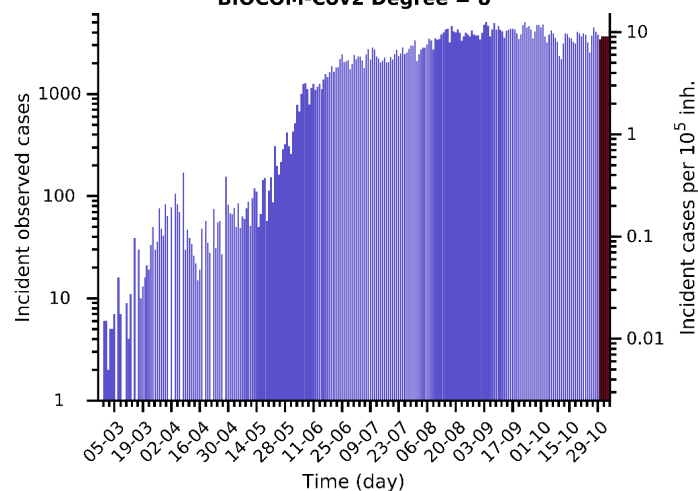
Day	Number of cases	95% Confidence Interval
30-10-2020	471137 (+3382)	[467755 - 475185]
01-11-2020	478401 (+3632)	[474192 - 482610]
03-11-2020	485664 (+3631)	[481110 - 490218]

Current indicators

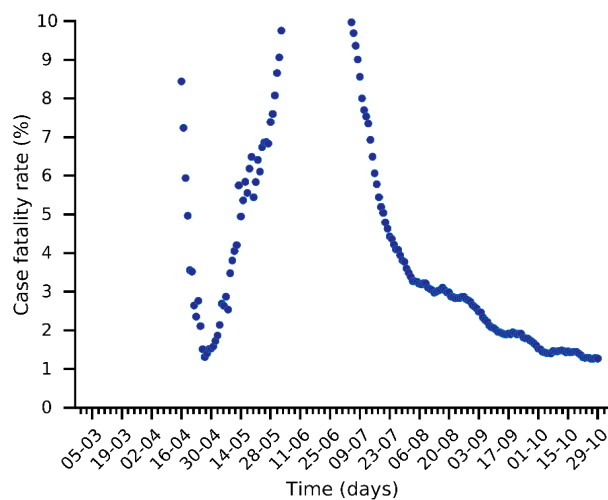
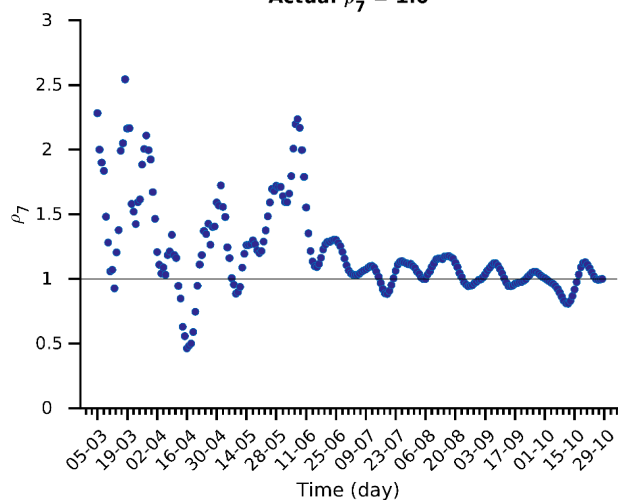
A ₁₄	EPG	CFR
127	127	1.27 %



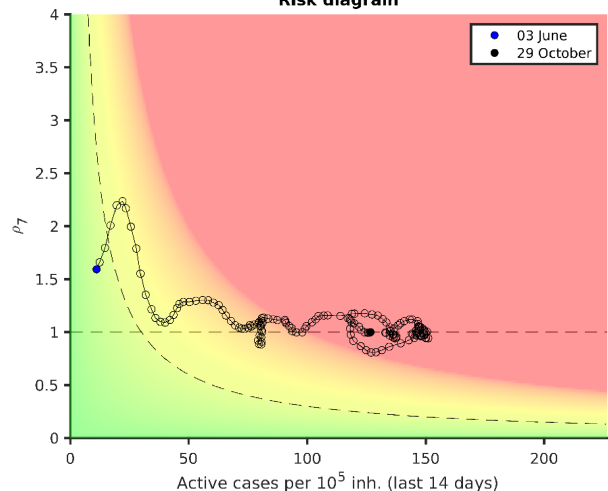
BIOCOM-Cov2 Degree = 8



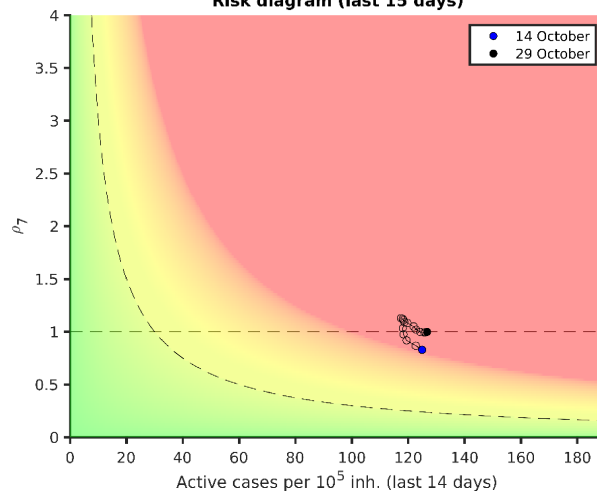
Actual $\rho_7 = 1.0$



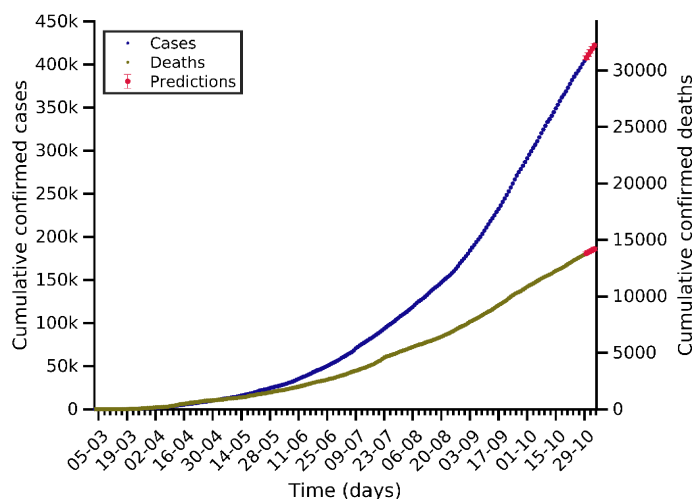
Risk diagram



Risk diagram (last 15 days)



Indonesia 29-10-2020. Pop: 273.5M. Cumulative incidence: 148/10⁵

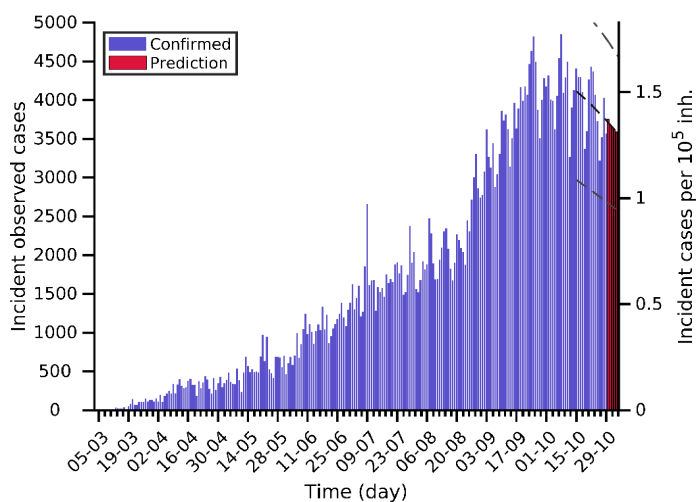


Predictions for next days

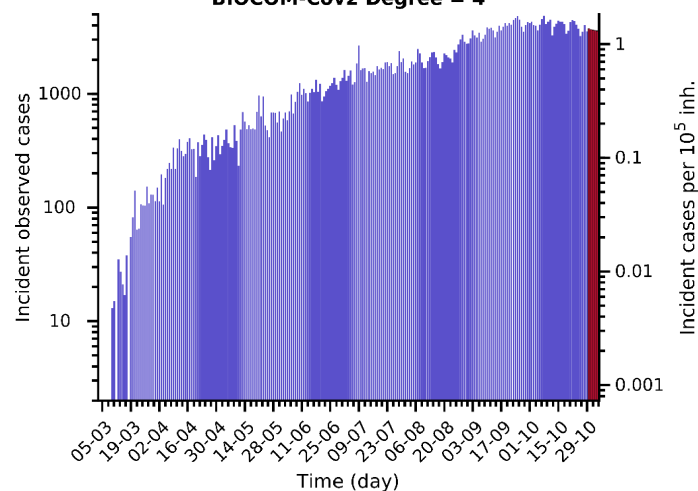
Day	Number of cases	95% Confidence Interval
30-10-2020	407799 (+3751)	[405674 - 409925]
01-11-2020	415131 (+3650)	[412926 - 417336]
03-11-2020	422338 (+3588)	[419965 - 424710]

Current indicators

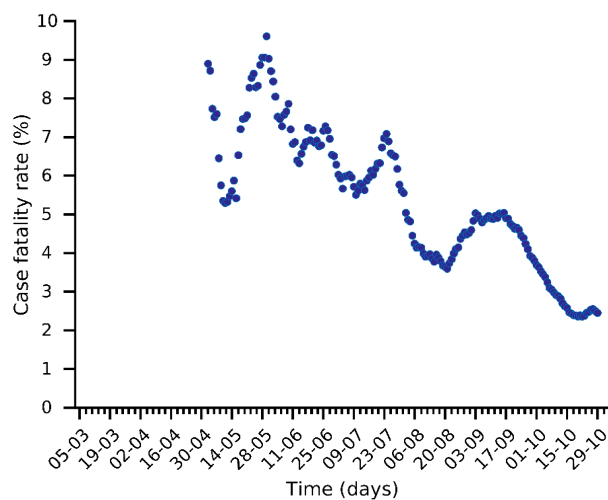
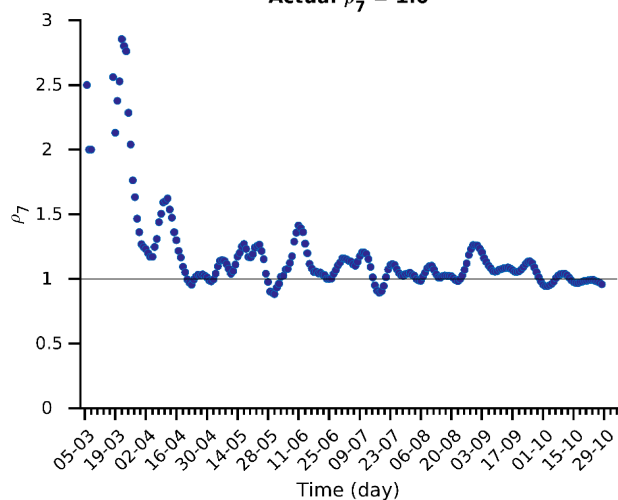
A ₁₄	EPG	CFR
20	19	2.45 %



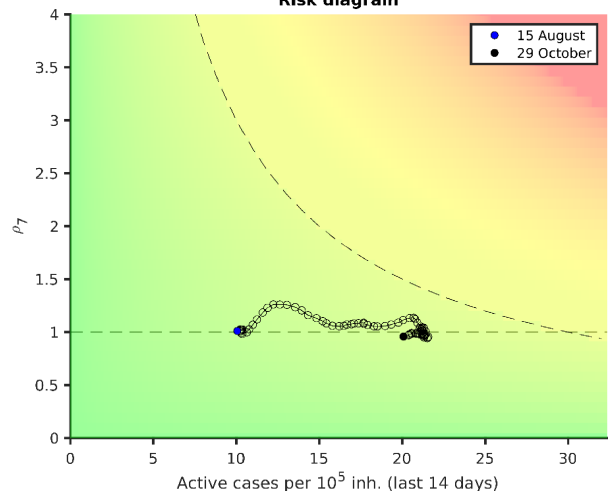
BIOCOM-Cov2 Degree = 4



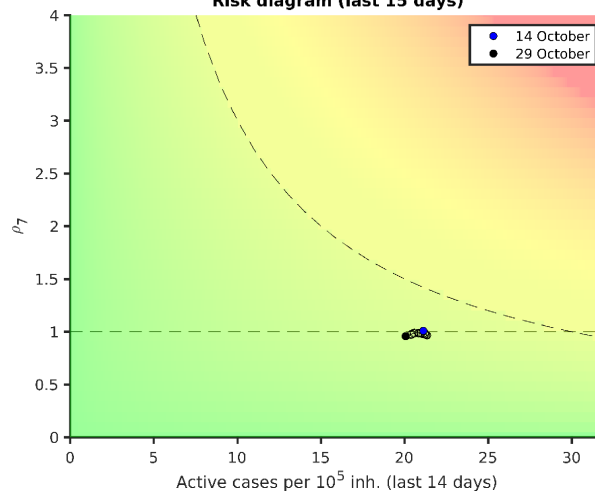
Actual $\rho_7 = 1.0$



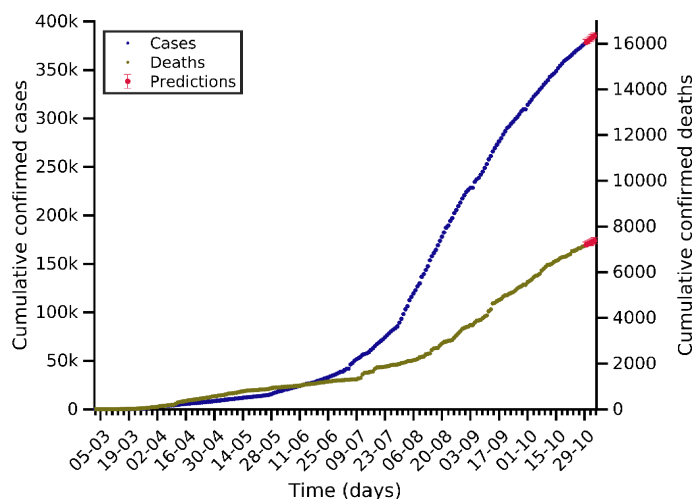
Risk diagram



Risk diagram (last 15 days)



Philippines 29-10-2020. Pop: 109.6M. Cumulative incidence: 344/10⁵

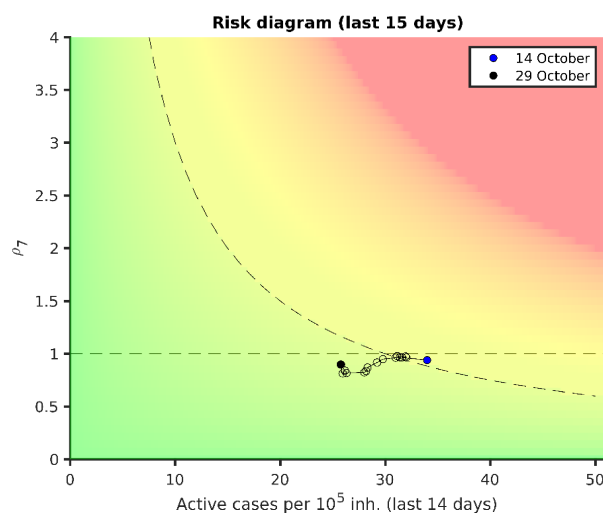
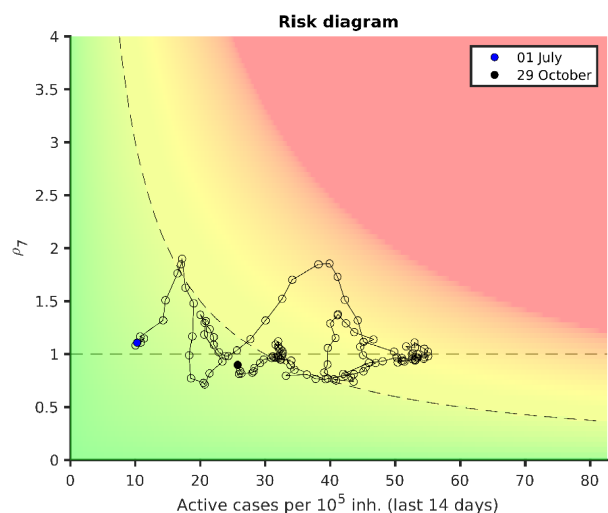
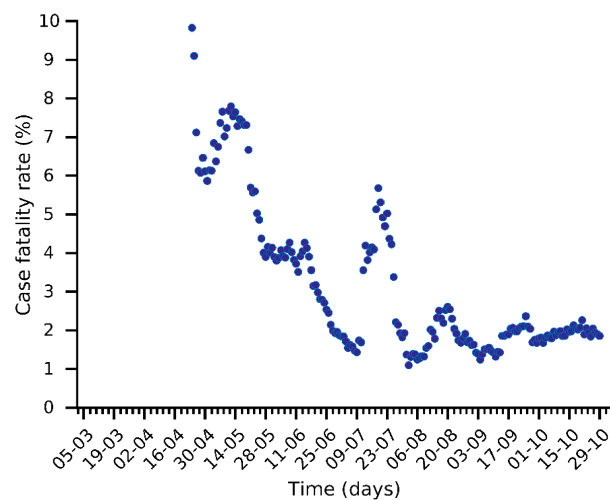
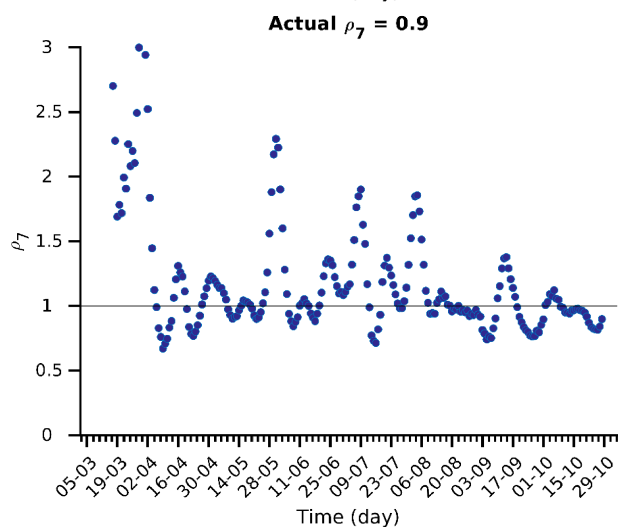
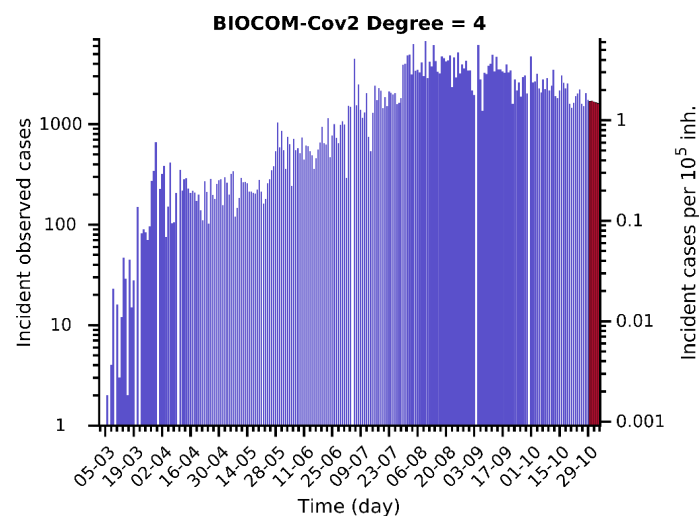
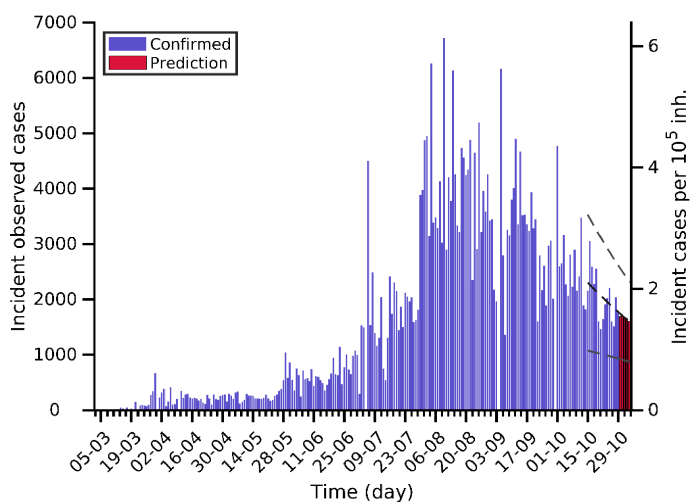


Predictions for next days

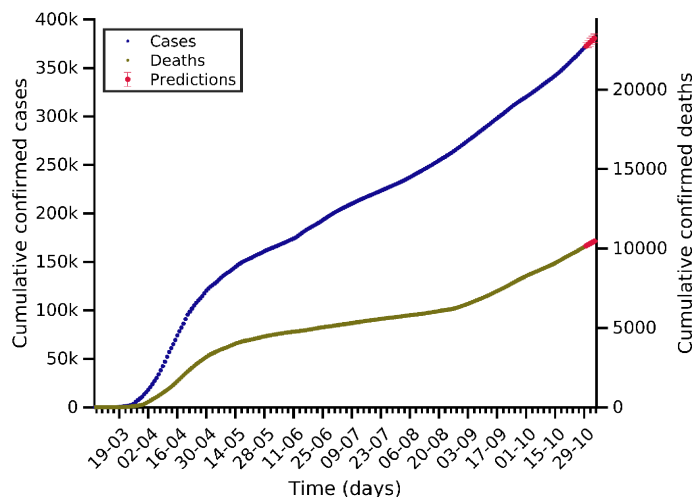
Day	Number of cases	95% Confidence Interval
30-10-2020	378627 (+1692)	[376935 - 381479]
01-11-2020	382007 (+1673)	[379059 - 384955]
03-11-2020	385255 (+1608)	[382113 - 388396]

Current indicators

A ₁₄	EPG	CFR
26	23	1.85 %



Turkey 29-10-2020. Pop: 84.3M. Cumulative incidence: 440/10⁵

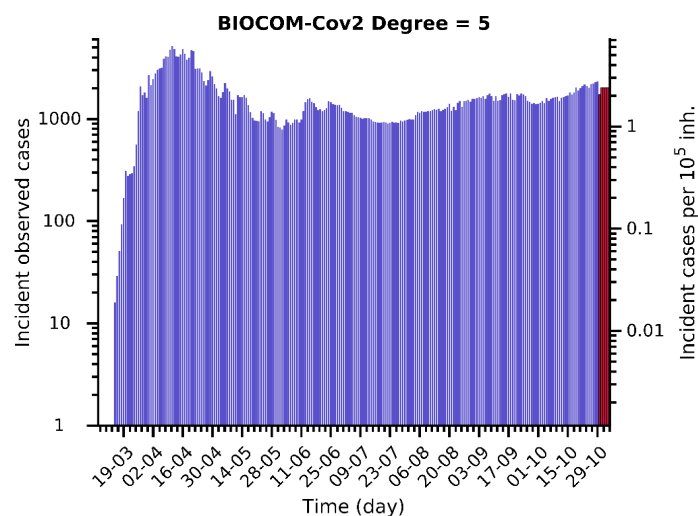
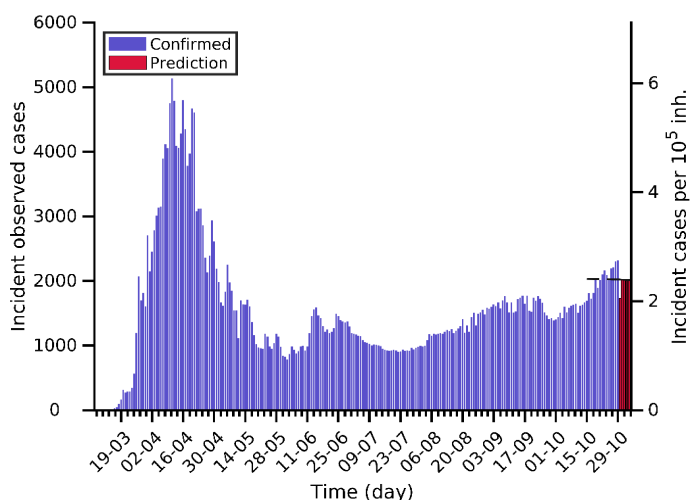


Predictions for next days

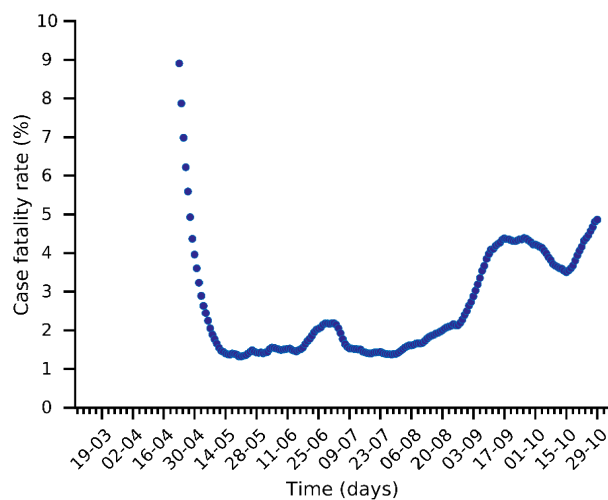
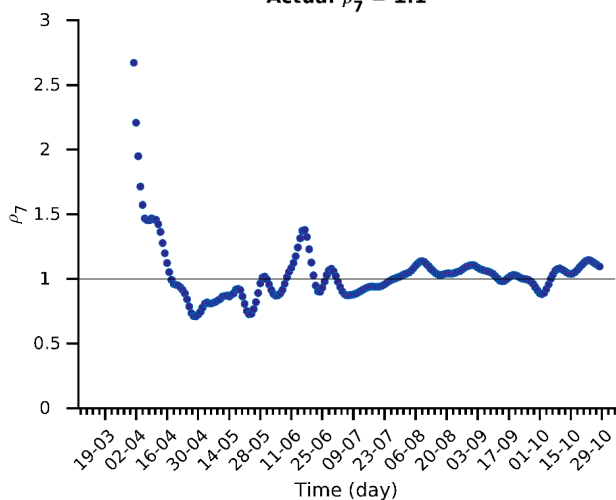
Day	Number of cases	95% Confidence Interval
30-10-2020	372561 (+1729)	[370832 - 376527]
01-11-2020	376598 (+2018)	[372476 - 380720]
03-11-2020	380629 (+2015)	[376175 - 385083]

Current indicators

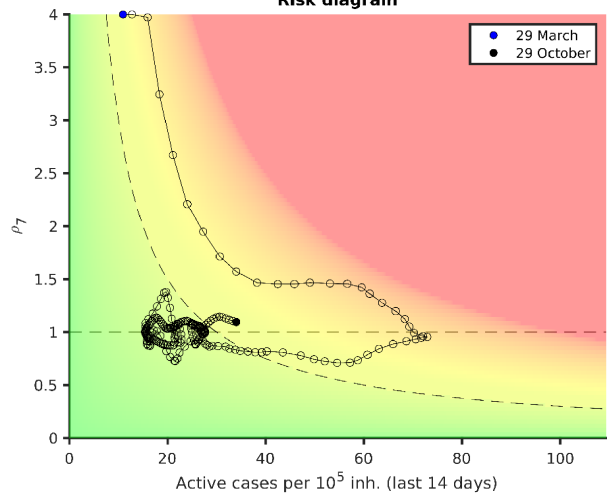
A ₁₄	EPG	CFR
34	37	4.86 %



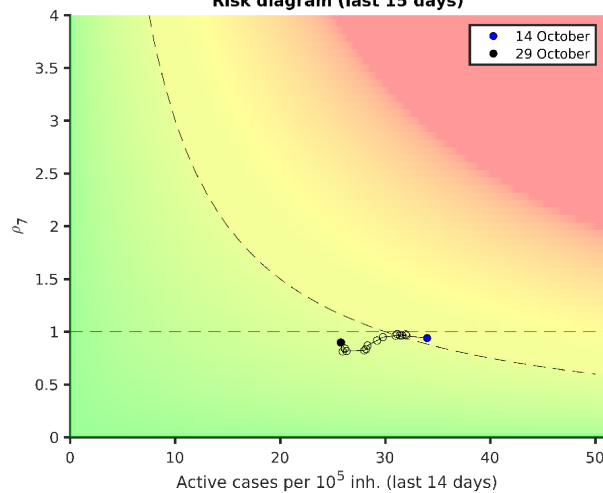
Actual $\rho_7 = 1.1$



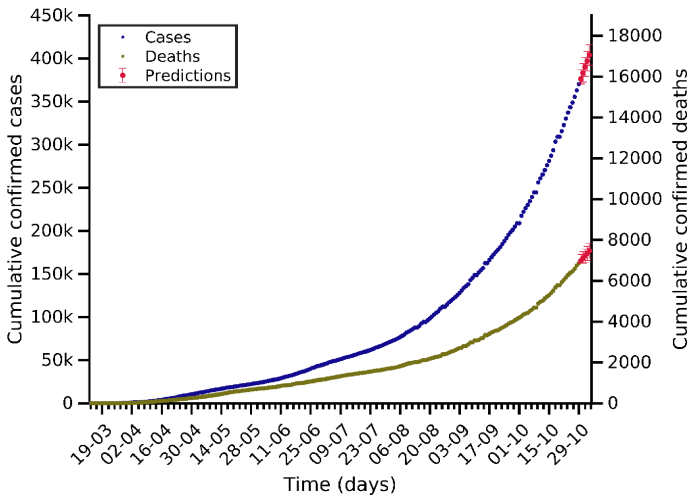
Risk diagram



Risk diagram (last 15 days)

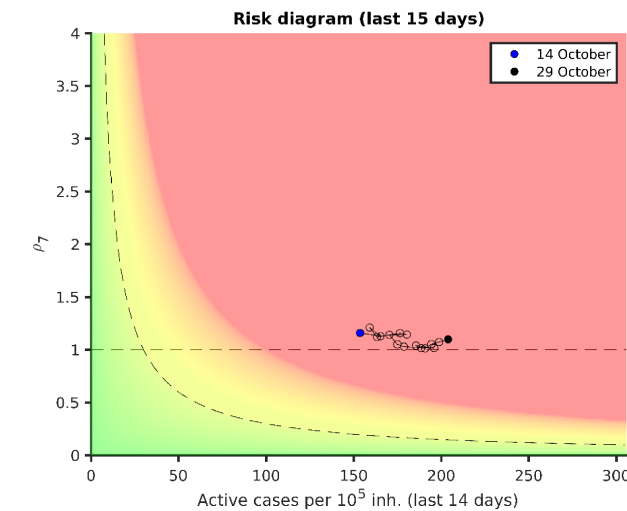
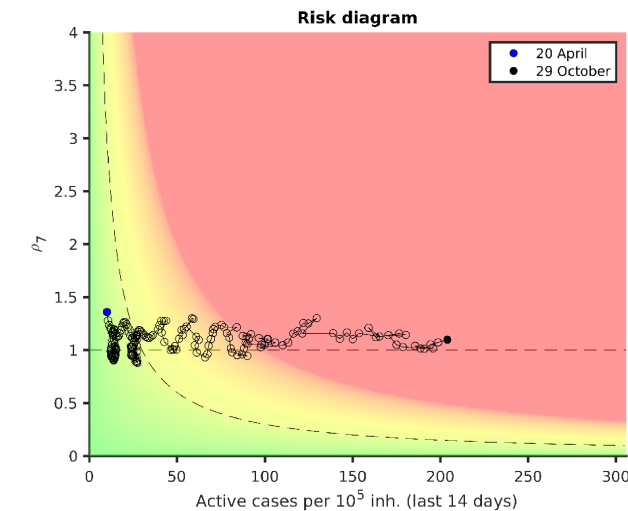
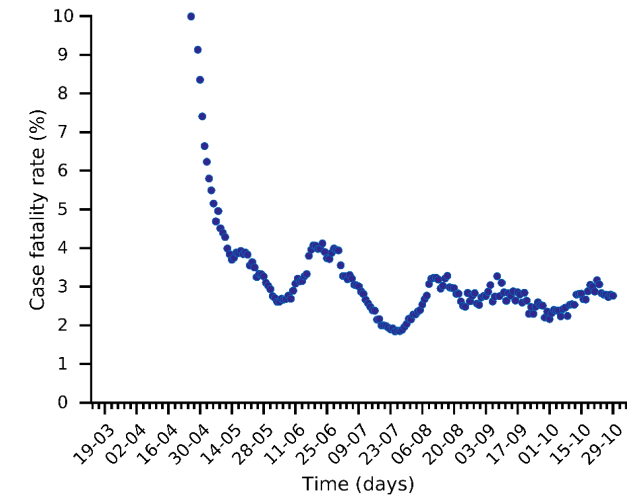
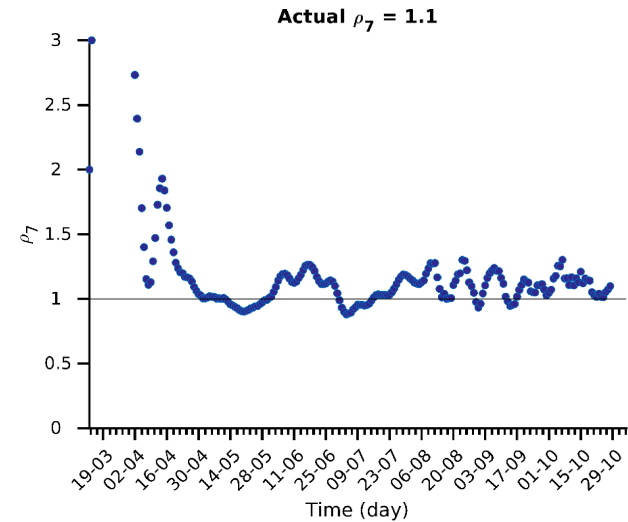
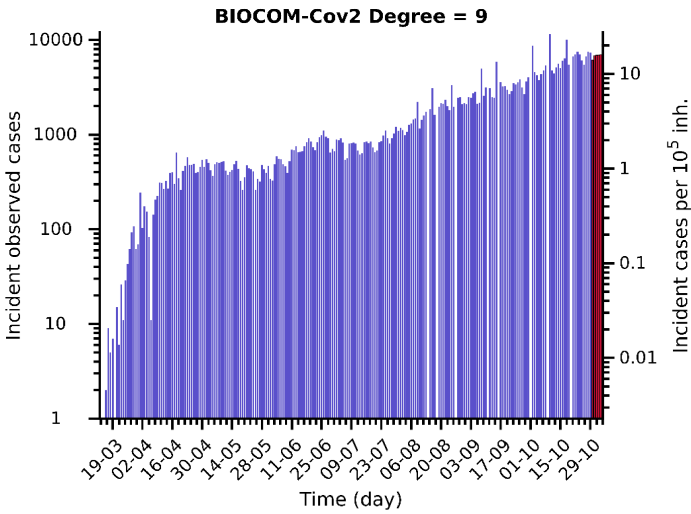
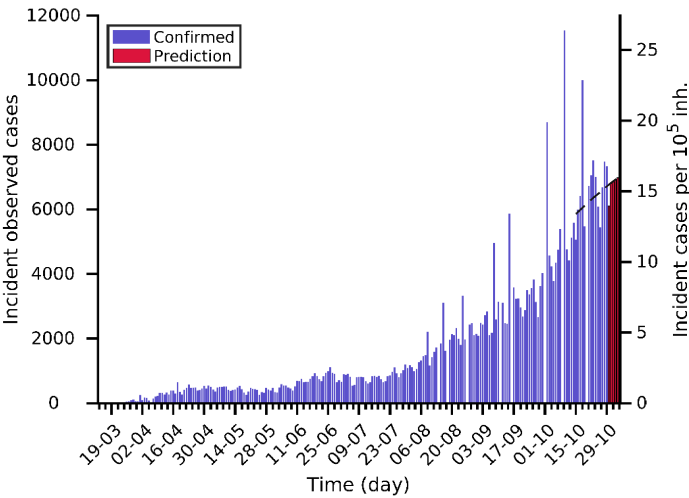


Ukraine 29-10-2020. Pop: 43.7M. Cumulative incidence: 847/10⁵

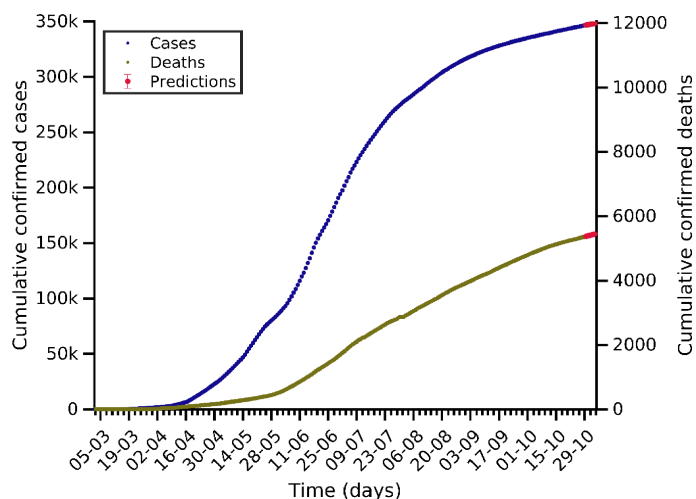


Predictions for next days		
Day	Number of cases	95% Confidence Interval
30-10-2020	376523 (+6106)	[370417 - 386991]
01-11-2020	390214 (+6873)	[379285 - 401143]
03-11-2020	404119 (+6979)	[392164 - 416074]

Current indicators		
A ₁₄	EPG	CFR
204	224	2.77 %



Saudi Arabia 29-10-2020. Pop: 34.8M. Cumulative incidence: 995/10⁵

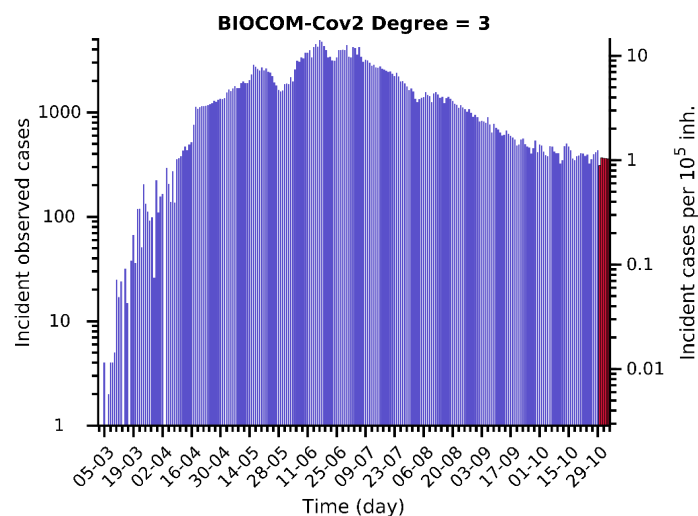
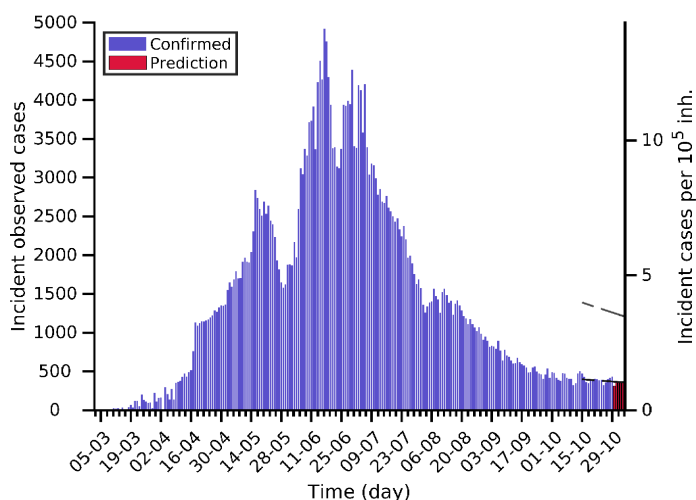


Predictions for next days

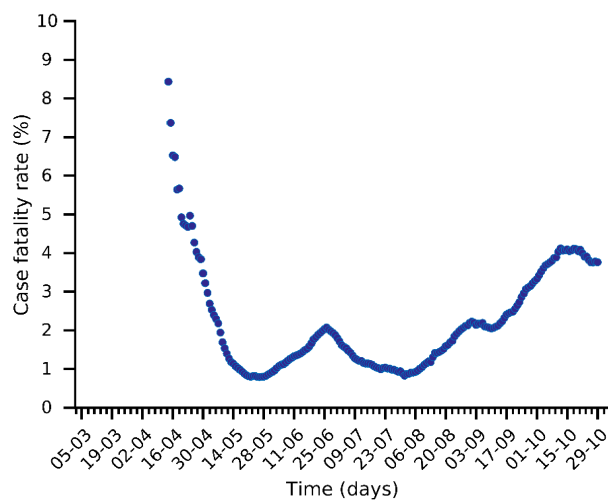
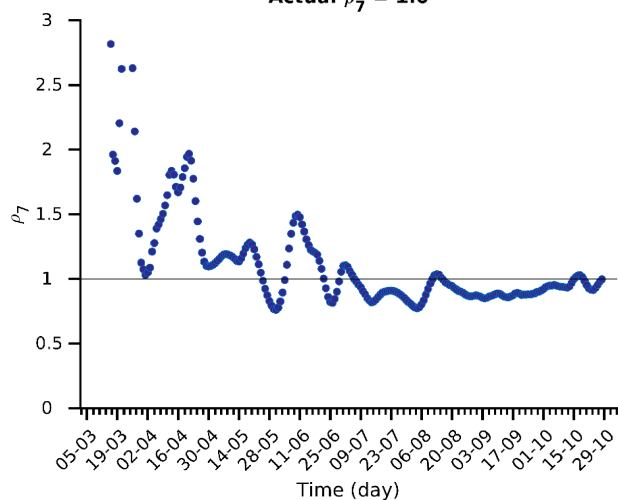
Day	Number of cases	95% Confidence Interval
30-10-2020	346793 (+311)	[346482 - 347463]
01-11-2020	347523 (+364)	[346828 - 348218]
03-11-2020	348244 (+360)	[347497 - 348991]

Current indicators

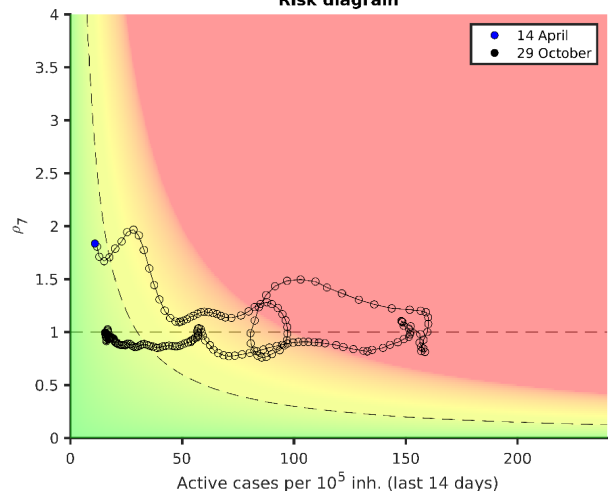
A ₁₄	EPG	CFR
16	16	3.76 %



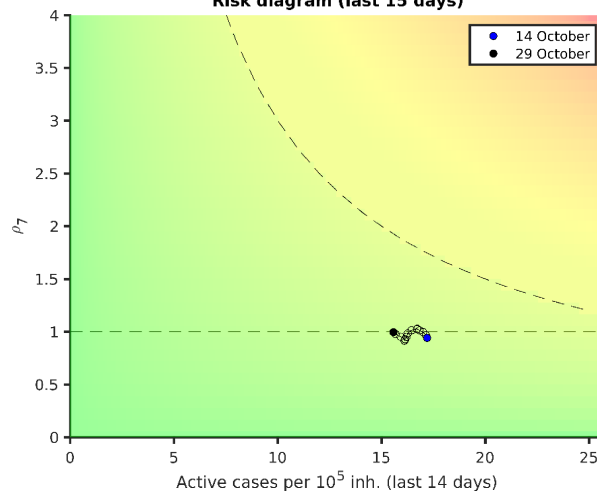
Actual $\rho_7 = 1.0$



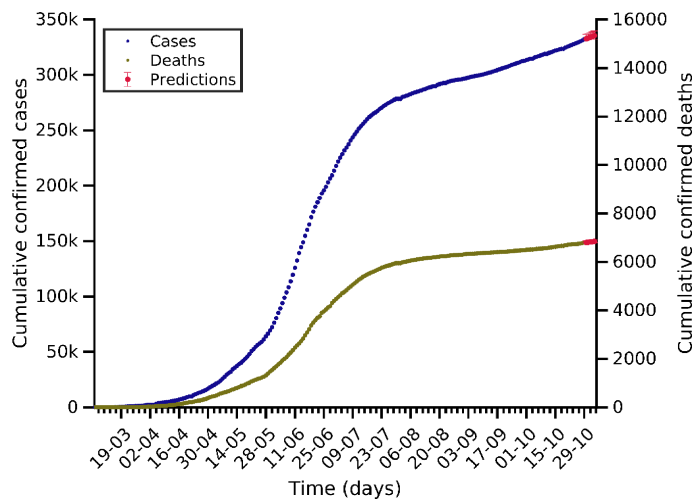
Risk diagram



Risk diagram (last 15 days)



Pakistan 29-10-2020. Pop: 220.9M. Cumulative incidence: 150/10⁵

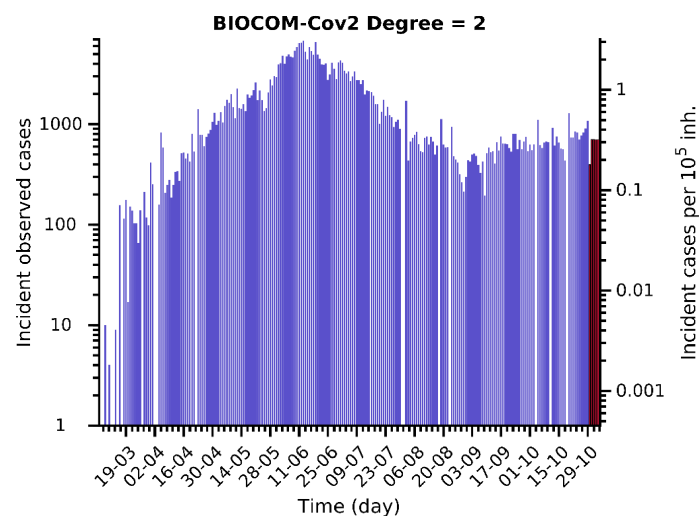
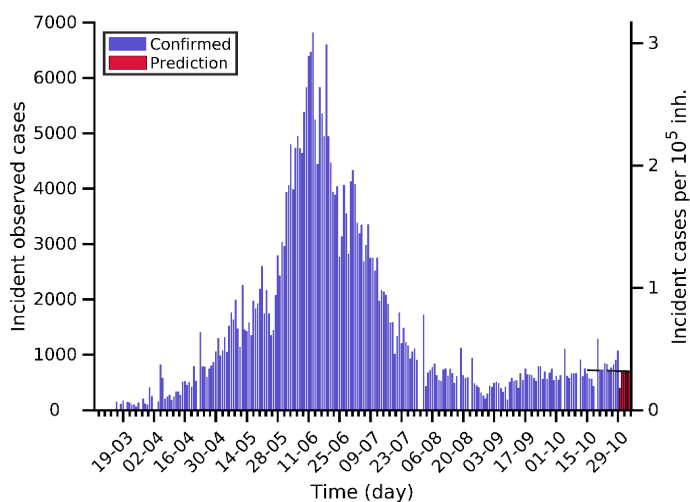


Predictions for next days

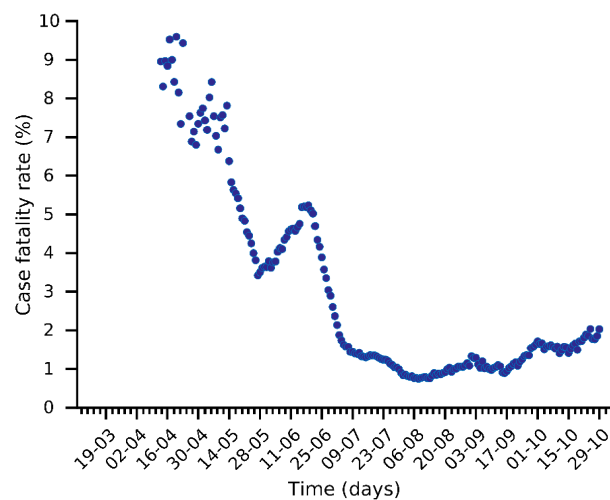
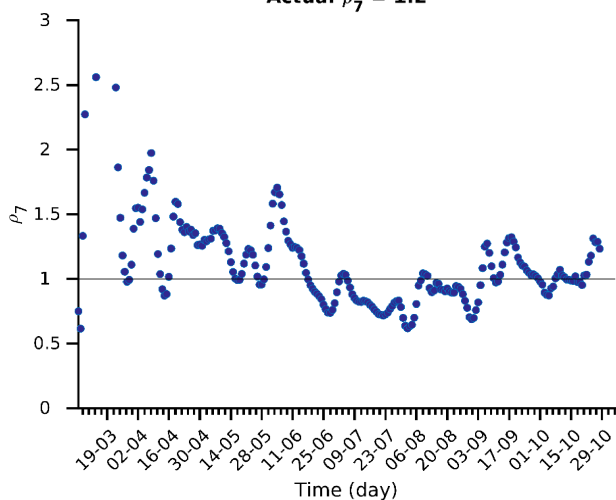
Day	Number of cases	95% Confidence Interval
30-10-2020	332582 (+396)	[332186 - 336476]
01-11-2020	333990 (+704)	[332186 - 338035]
03-11-2020	335395 (+702)	[332186 - 339756]

Current indicators

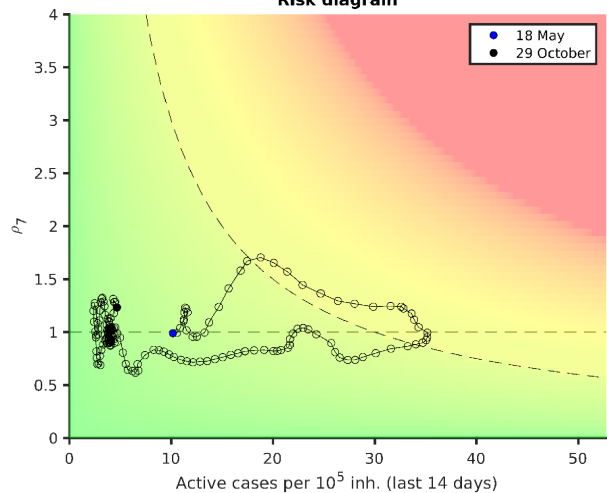
A ₁₄	EPG	CFR
5	6	2.03 %



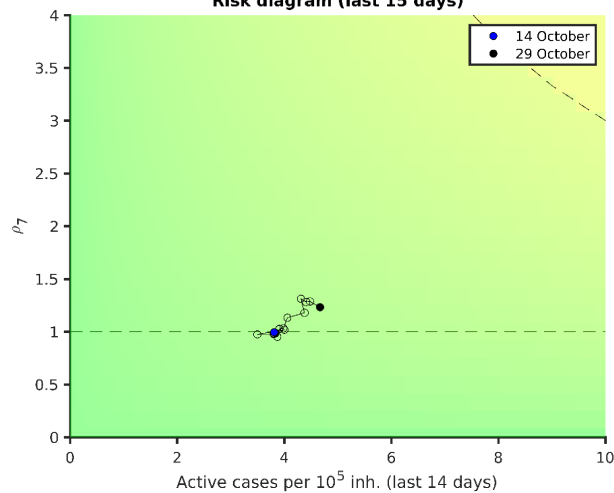
Actual $\rho_7 = 1.2$



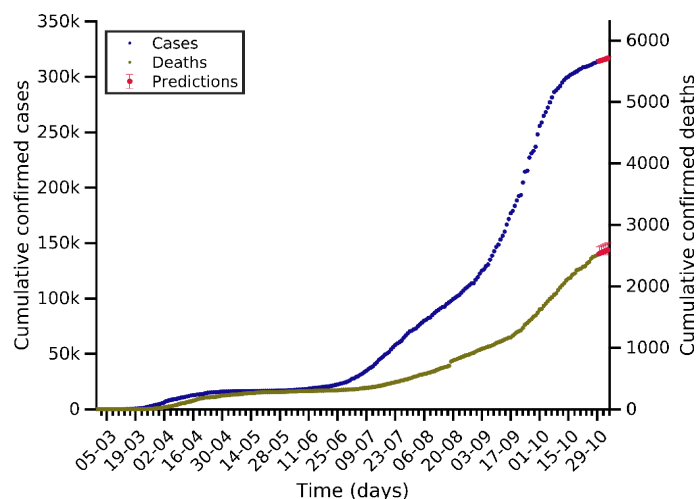
Risk diagram



Risk diagram (last 15 days)



Israel 29-10-2020. Pop: 8.7M. Cumulative incidence: 3623/10⁵

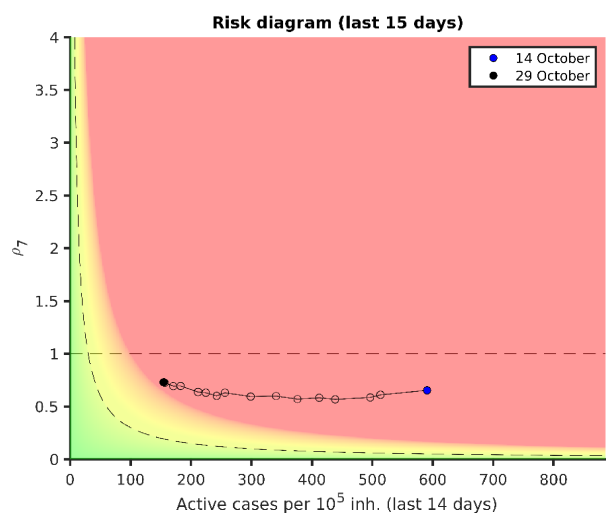
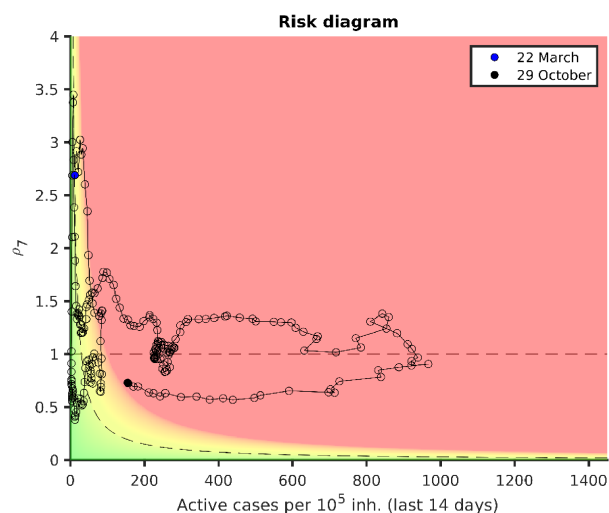
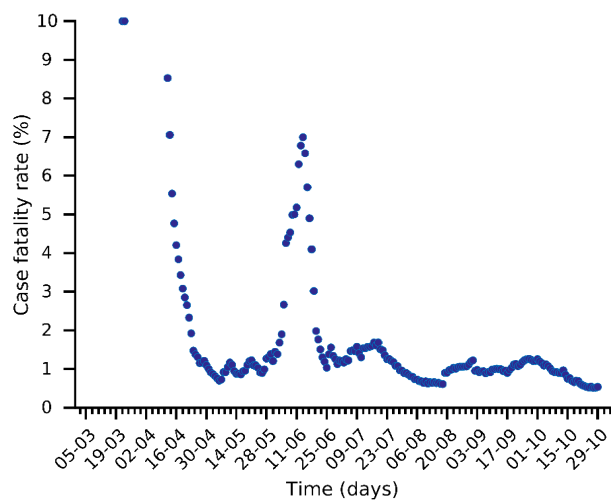
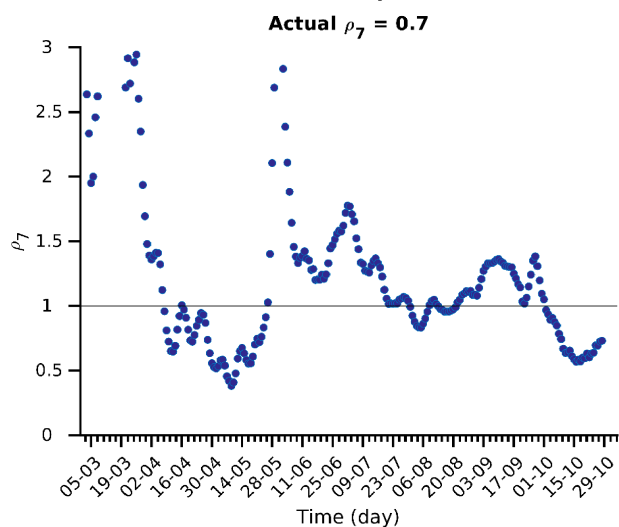
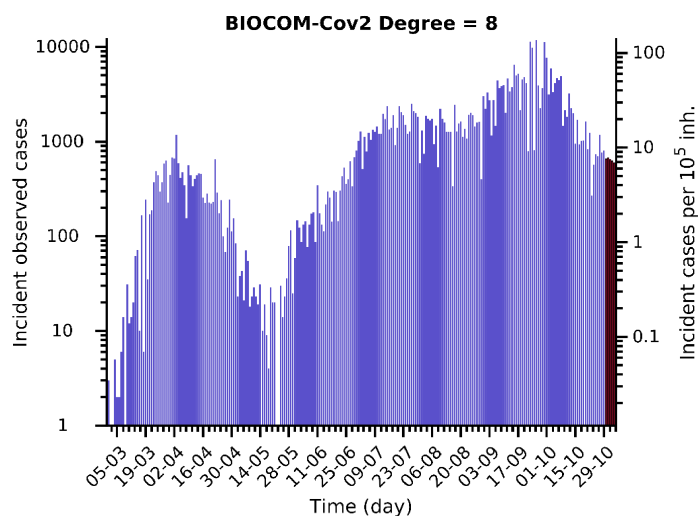
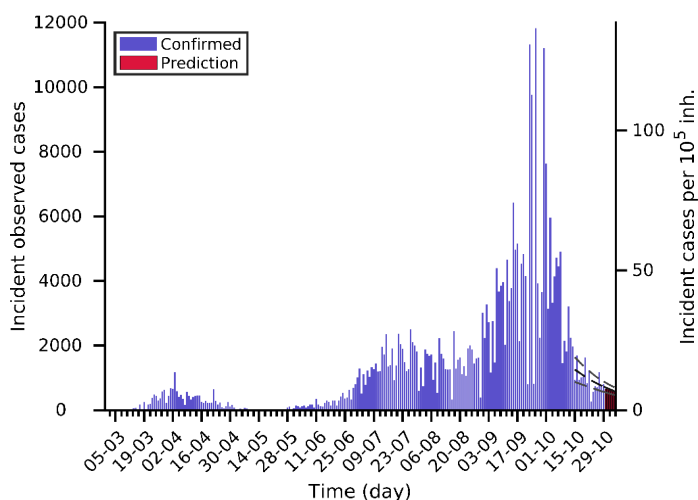


Predictions for next days

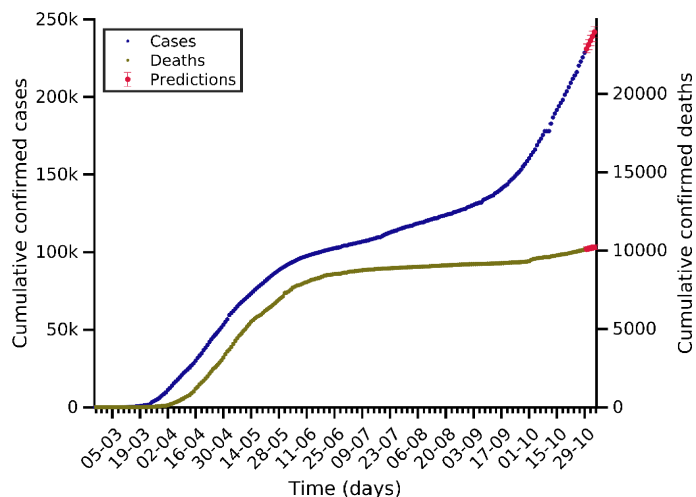
Day	Number of cases	95% Confidence Interval
30-10-2020	314243 (+653)	[313590 - 315550]
01-11-2020	315562 (+646)	[314218 - 316906]
03-11-2020	316780 (+597)	[315366 - 318194]

Current indicators

A ₁₄	EPG	CFR
155	113	0.53 %



Canada 29-10-2020. Pop: 37.7M. Cumulative incidence: 606/10⁵

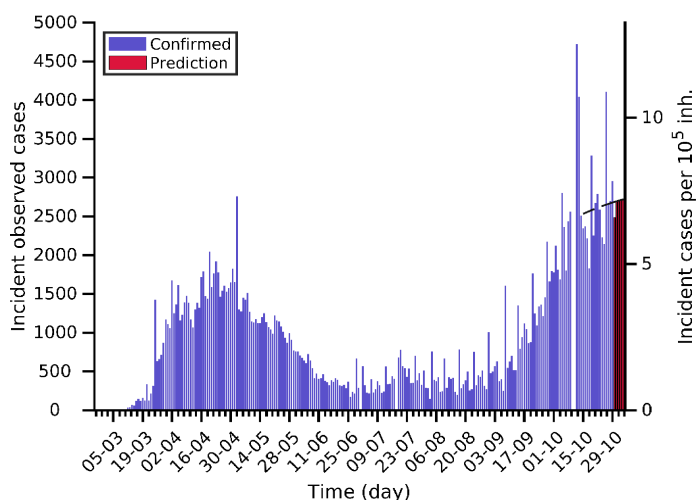


Predictions for next days

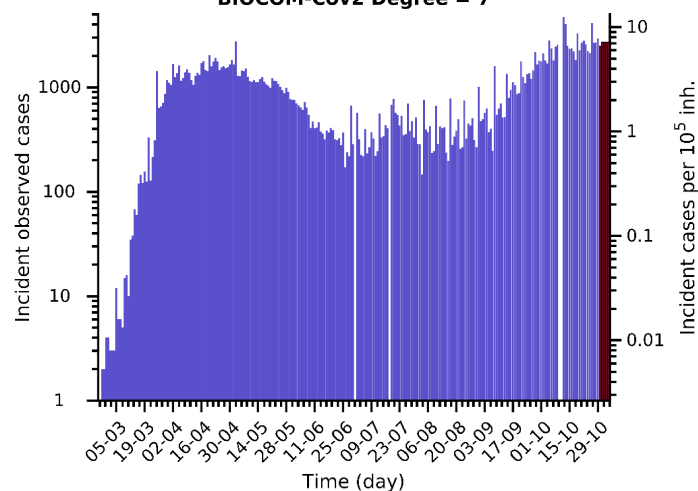
Day	Number of cases	95% Confidence Interval
30-10-2020	231028 (+2486)	[228542 - 234178]
01-11-2020	236426 (+2703)	[233146 - 239706]
03-11-2020	241856 (+2719)	[238292 - 245420]

Current indicators

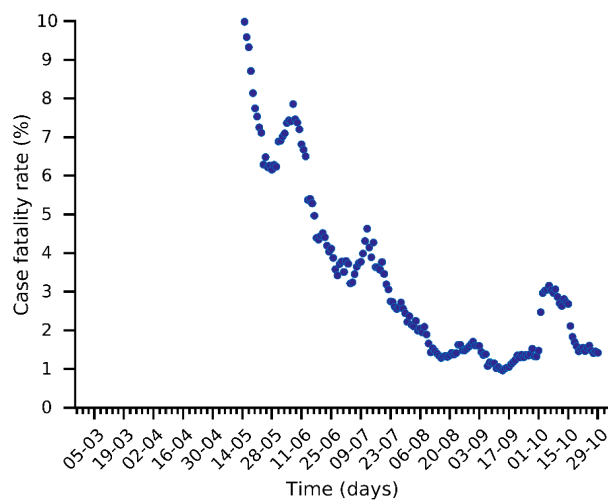
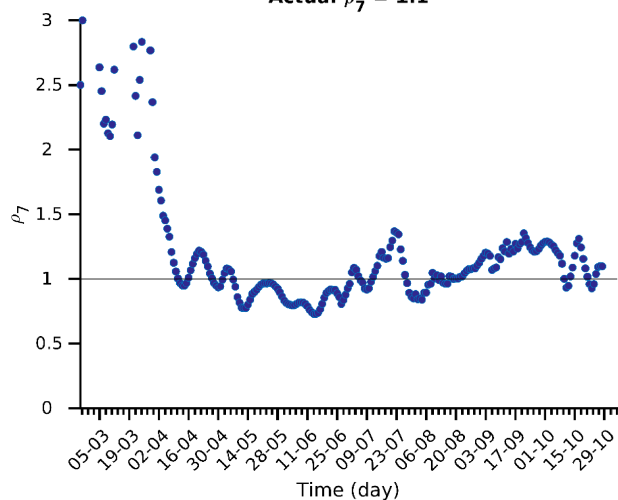
A ₁₄	EPG	CFR
98	107	1.42 %



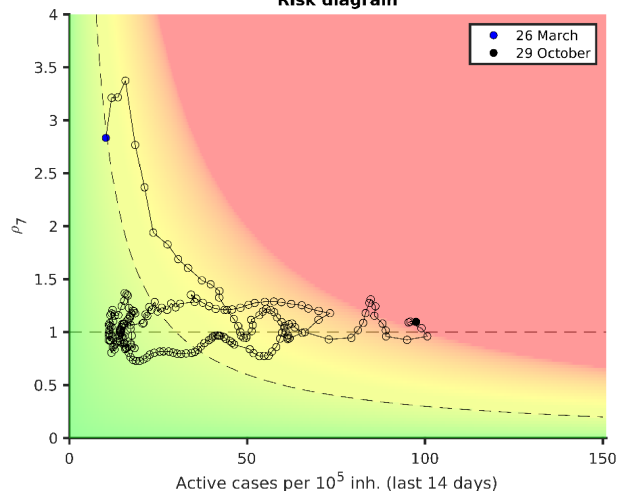
BIOCOM-Cov2 Degree = 7



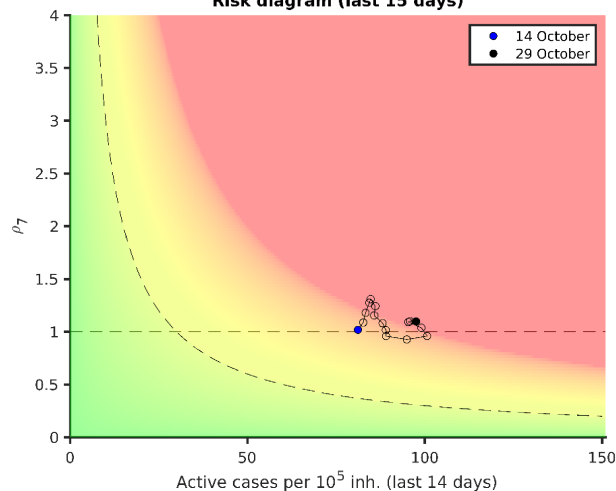
Actual $\rho_7 = 1.1$



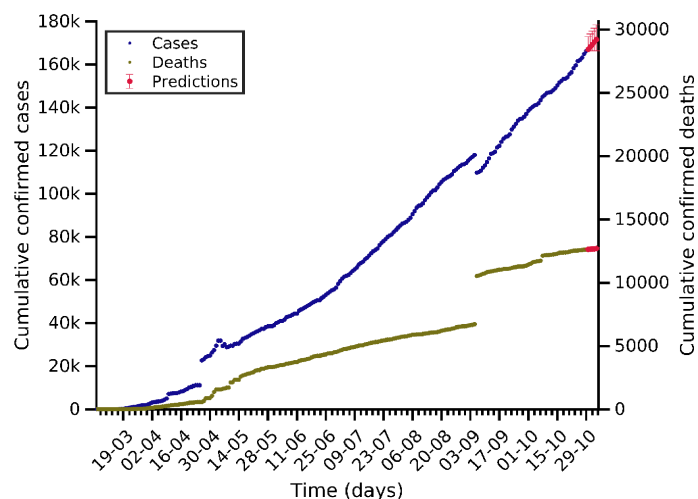
Risk diagram



Risk diagram (last 15 days)



Ecuador 29-10-2020. Pop: 17.6M. Cumulative incidence: 943/10⁵

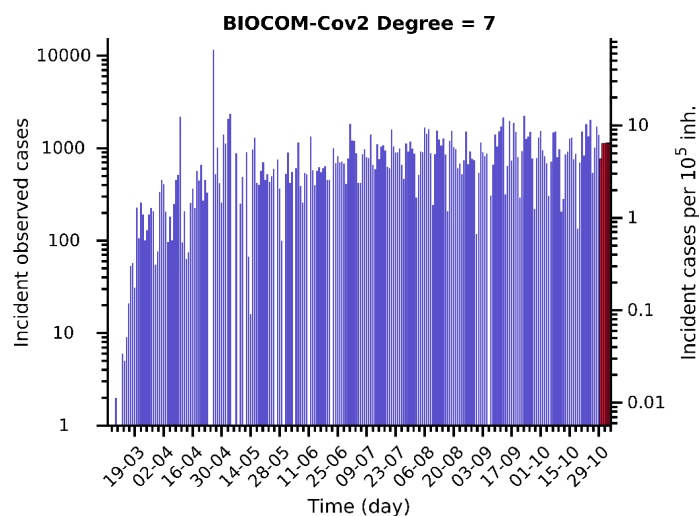
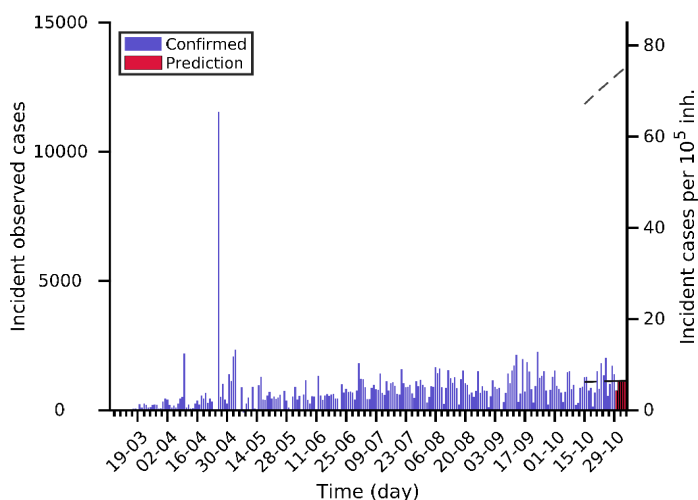


Predictions for next days

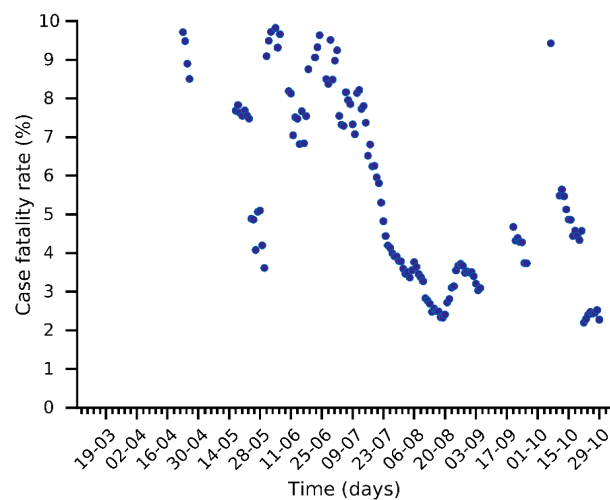
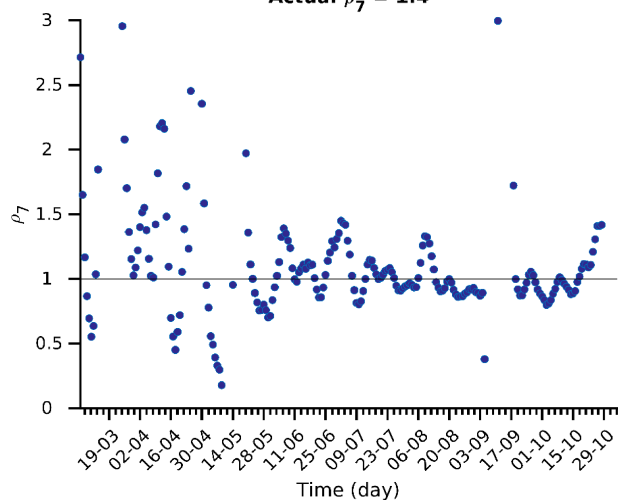
Day	Number of cases	95% Confidence Interval
30-10-2020	167066 (+764)	[166302 - 173021]
01-11-2020	169332 (+1134)	[166302 - 175526]
03-11-2020	171605 (+1138)	[166302 - 178315]

Current indicators

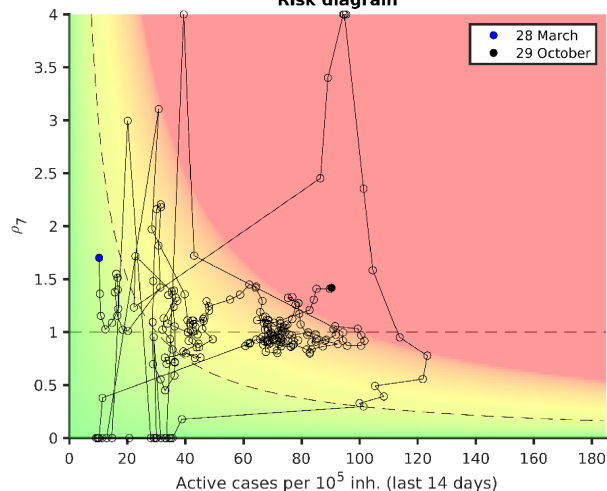
A ₁₄	EPG	CFR
90	128	2.27 %



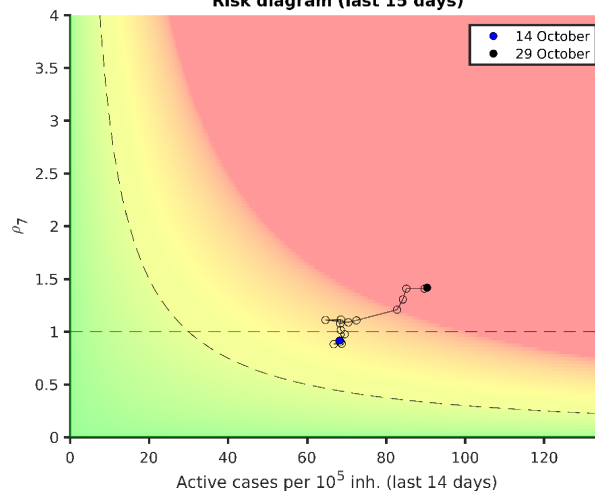
Actual $\rho_7 = 1.4$



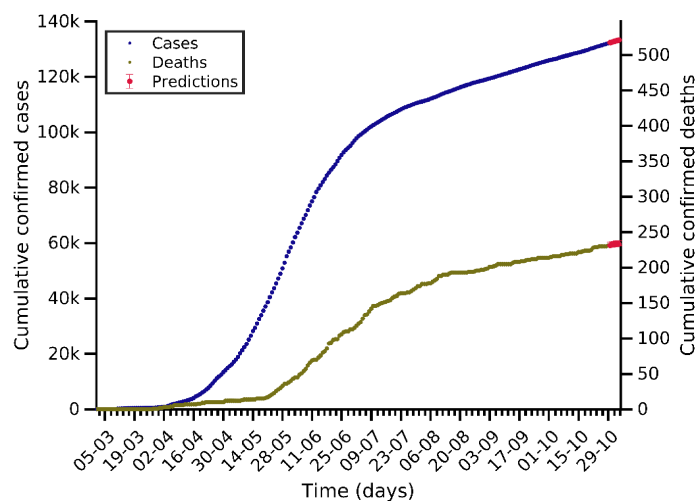
Risk diagram



Risk diagram (last 15 days)



Qatar 29-10-2020. Pop: 2.9M. Cumulative incidence: 4587/10⁵

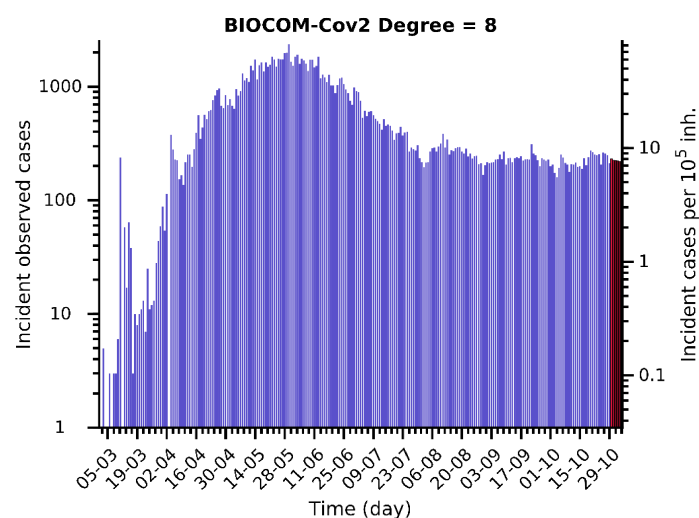
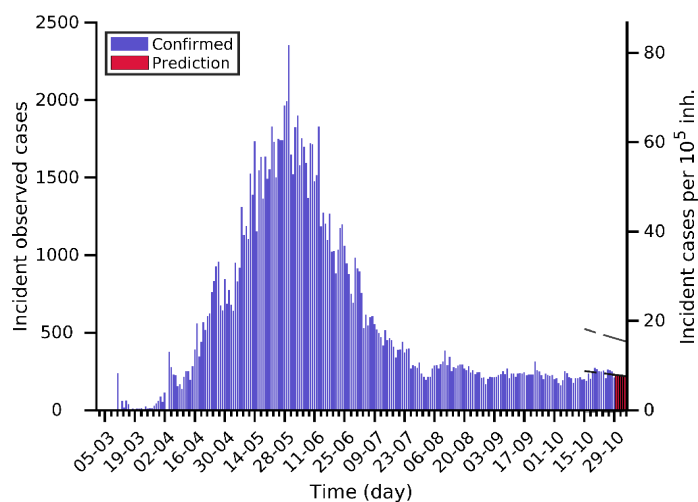


Predictions for next days

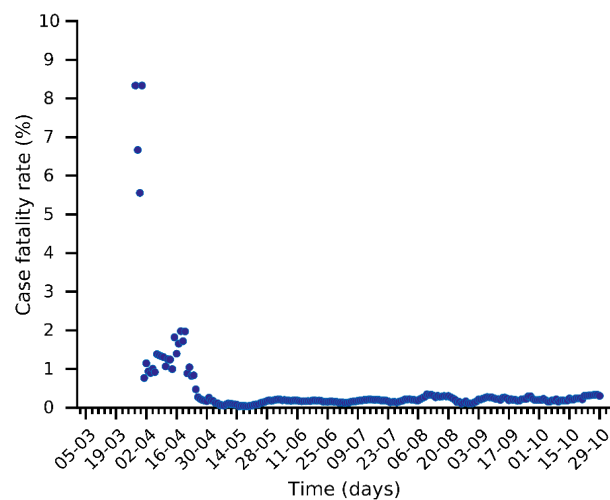
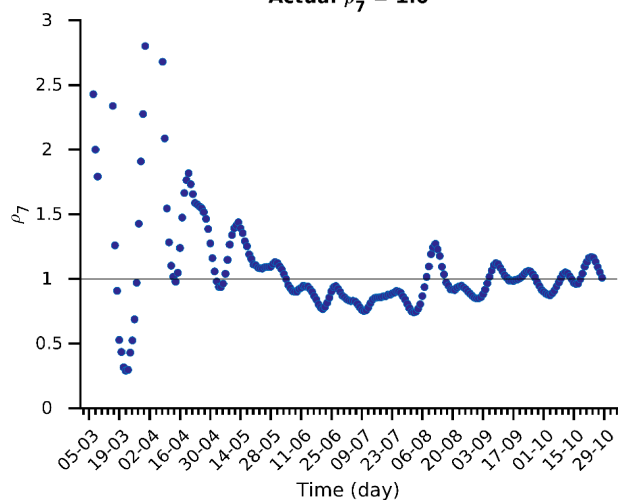
Day	Number of cases	95% Confidence Interval
30-10-2020	132381 (+231)	[132150 - 132631]
01-11-2020	132829 (+223)	[132570 - 133089]
03-11-2020	133271 (+220)	[132993 - 133550]

Current indicators

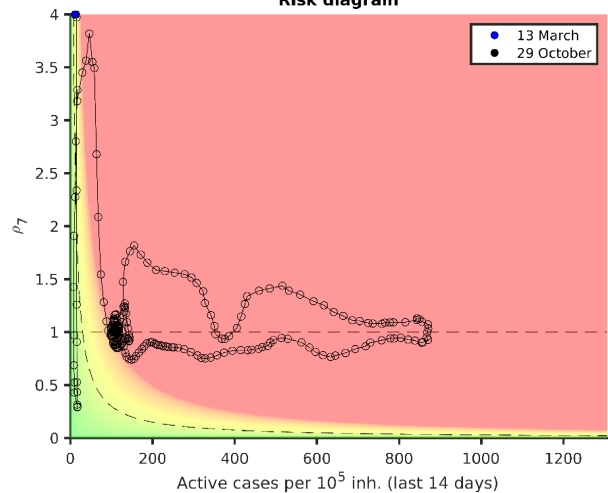
A ₁₄	EPG	CFR
116	117	0.30 %



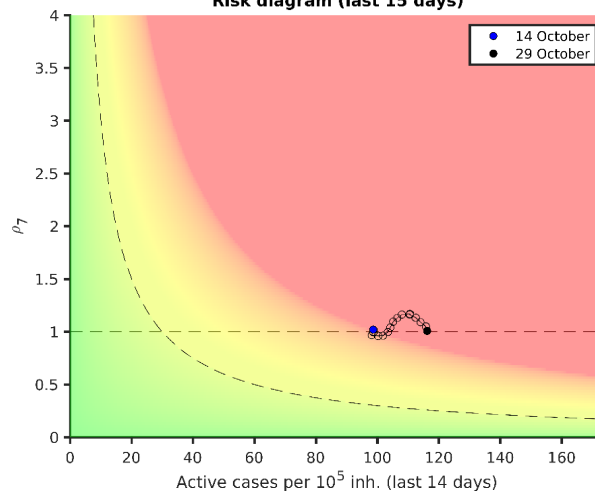
Actual $\rho_7 = 1.0$



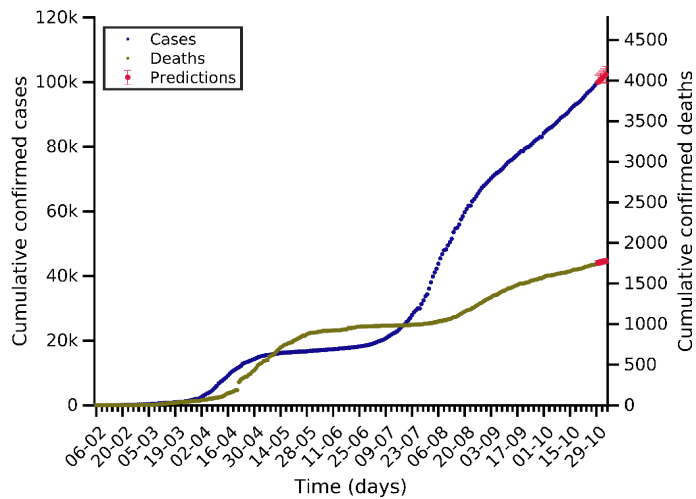
Risk diagram



Risk diagram (last 15 days)



Japan 29-10-2020. Pop: 126.5M. Cumulative incidence: 79/10⁵

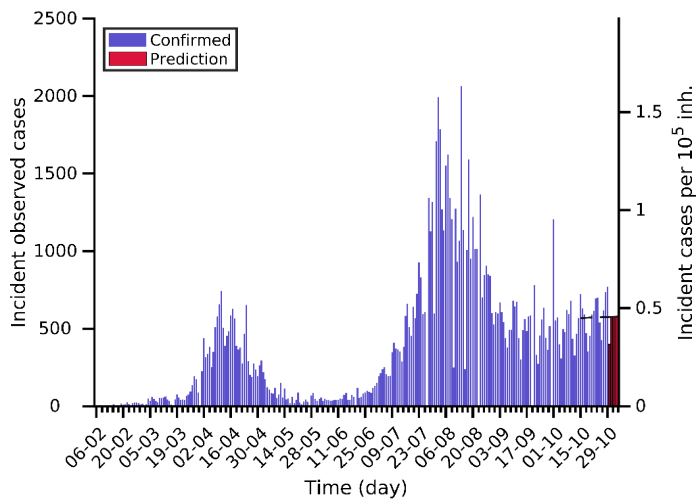


Predictions for next days

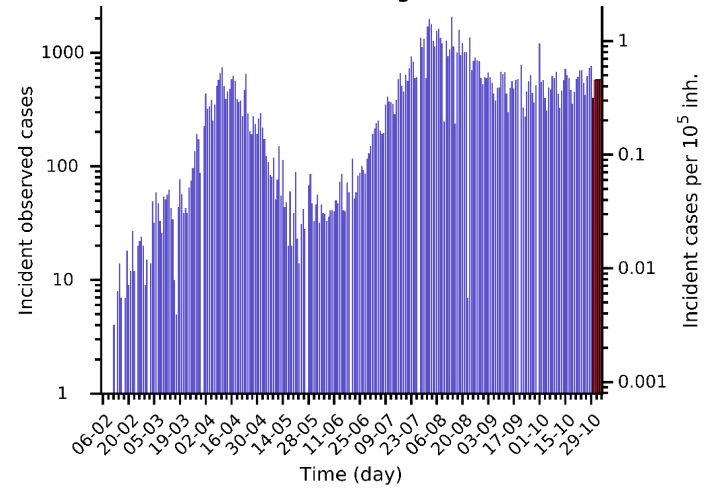
Day	Number of cases	95% Confidence Interval
30-10-2020	30910 (+820)	[30090 - 32359]
01-11-2020	32371 (+721)	[30869 - 33873]
03-11-2020	33758 (+684)	[32149 - 35366]

Current indicators

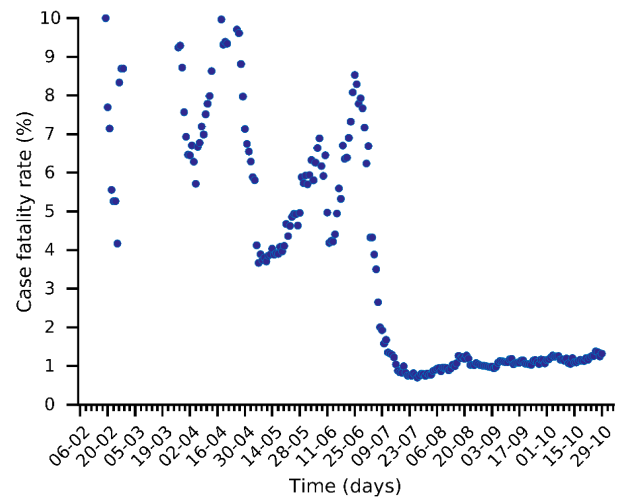
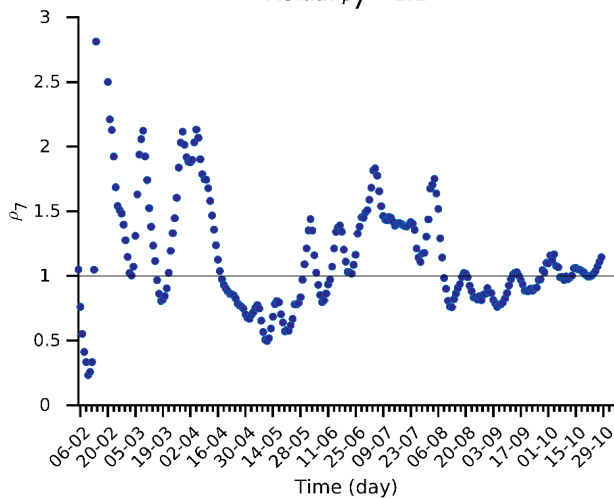
A ₁₄	EPG	CFR
37	40	2.00 %



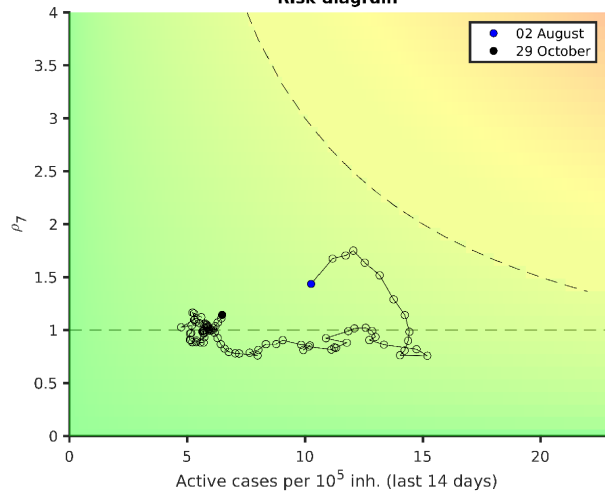
BIOCOM-Cov2 Degree = 3



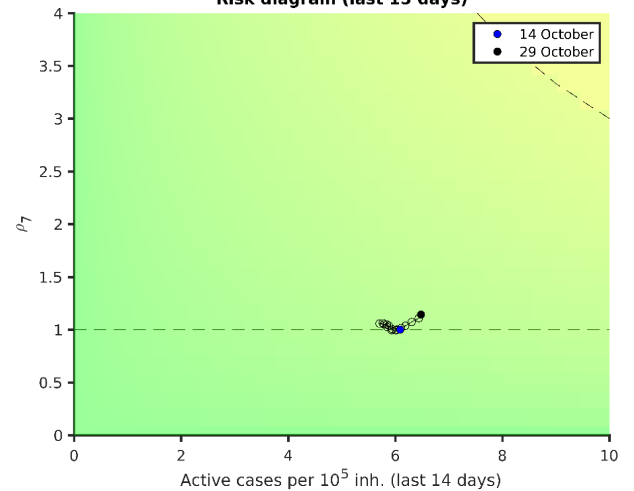
Actual $\rho_7 = 1.1$



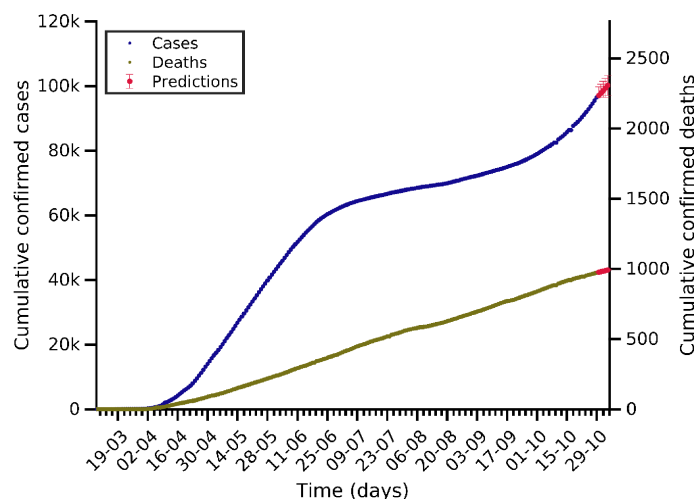
Risk diagram



Risk diagram (last 15 days)



Belarus 29-10-2020. Pop: 9.4M. Cumulative incidence: 1022/10⁵

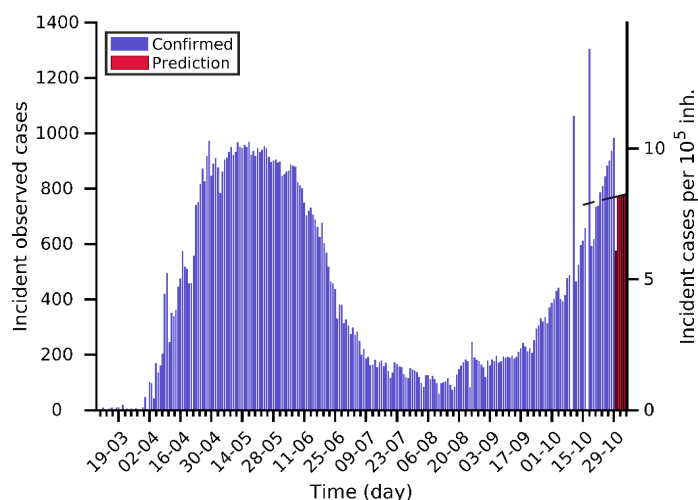


Predictions for next days

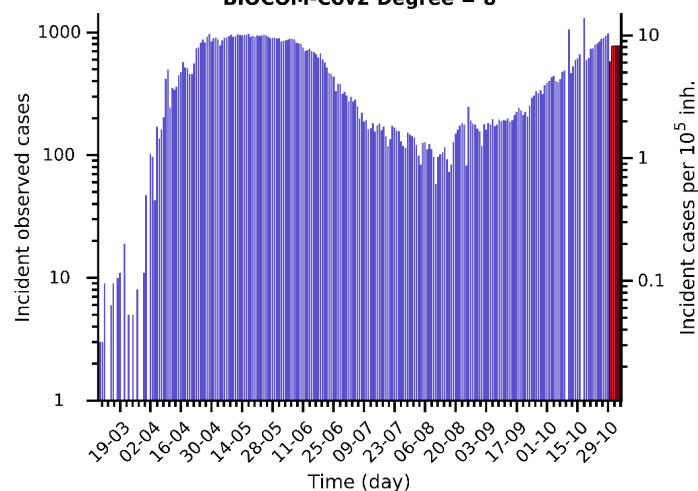
Day	Number of cases	95% Confidence Interval
30-10-2020	97103 (+574)	[96529 - 99807]
01-11-2020	98651 (+775)	[96529 - 101465]
03-11-2020	100206 (+778)	[97156 - 103257]

Current indicators

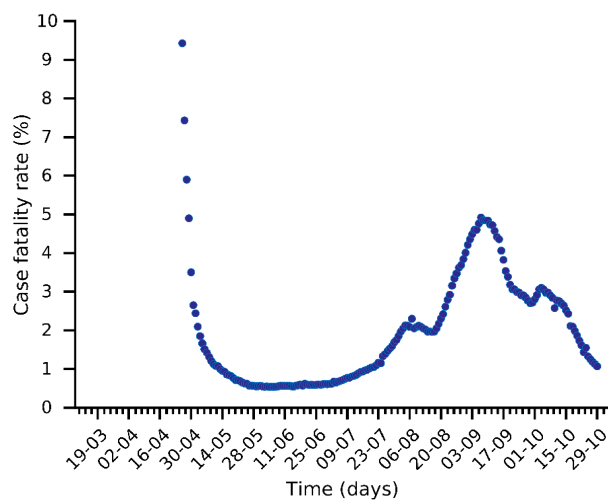
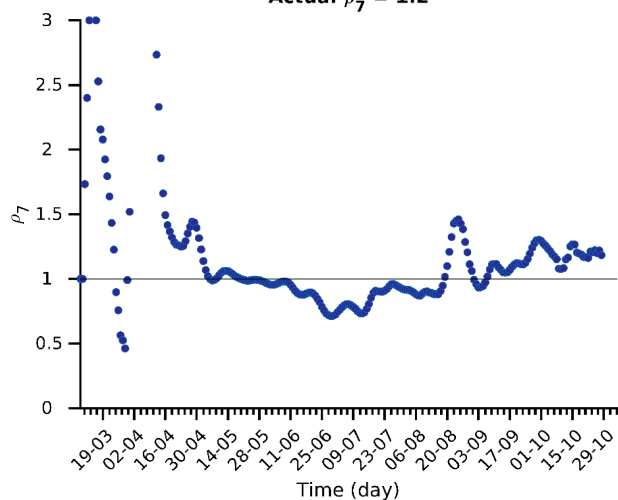
A ₁₄	EPG	CFR
114	135	1.07 %



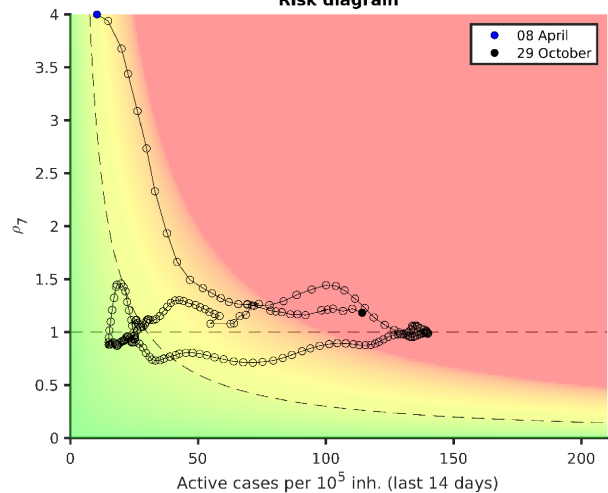
BIOCOM-Cov2 Degree = 8



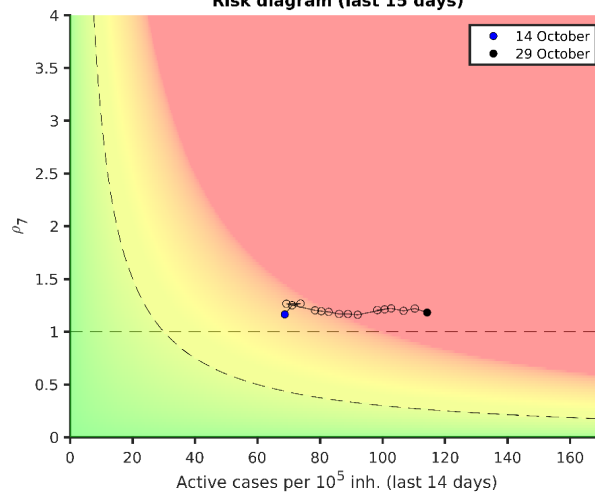
Actual $\rho_7 = 1.2$



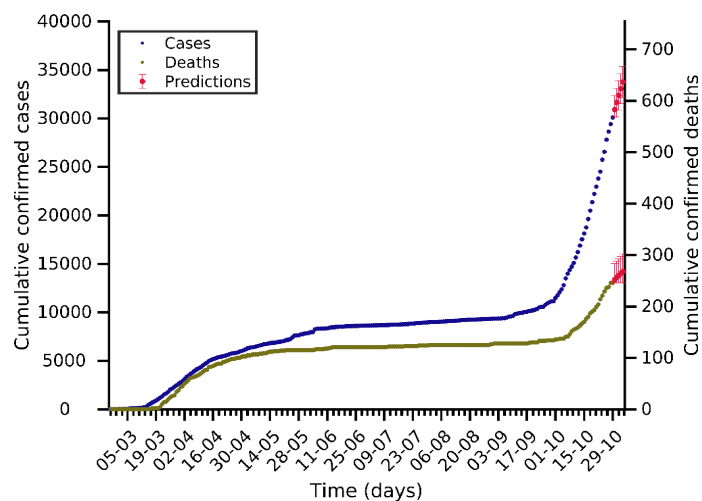
Risk diagram



Risk diagram (last 15 days)



Malaysia 29-10-2020. Pop: 32.4M. Cumulative incidence: 93/10⁵

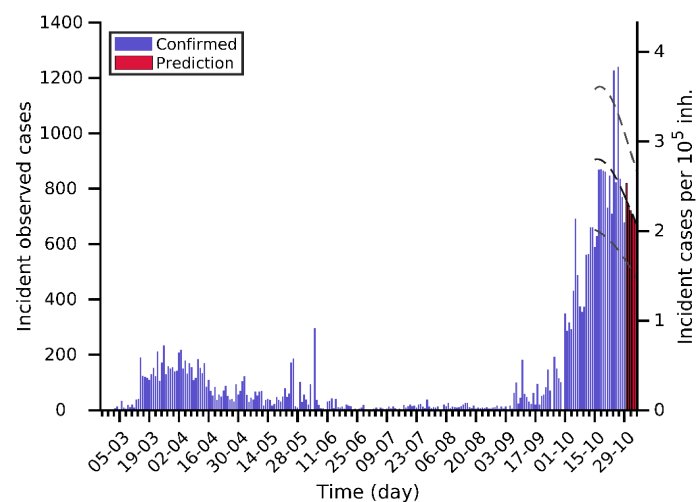


Predictions for next days

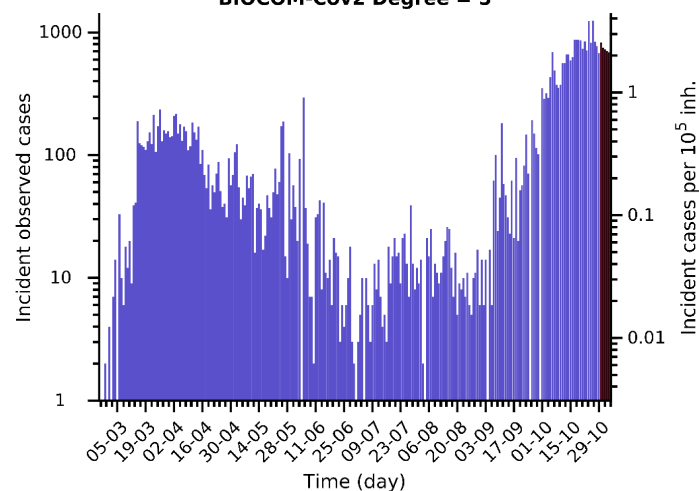
Day	Number of cases	95% Confidence Interval
30-10-2020	30910 (+820)	[30090 - 32359]
01-11-2020	32371 (+721)	[30869 - 33873]
03-11-2020	33758 (+684)	[32149 - 35366]

Current indicators

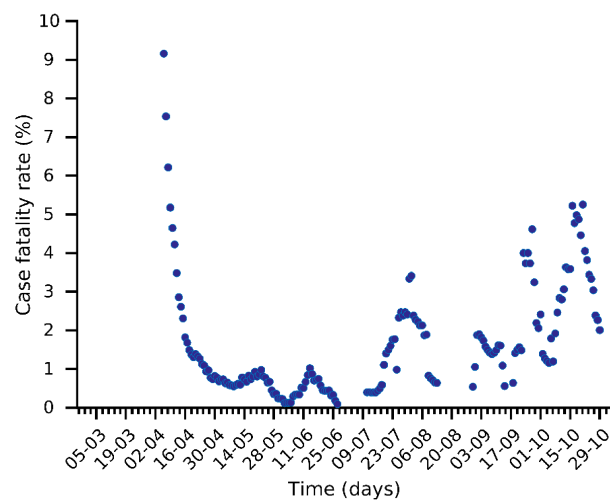
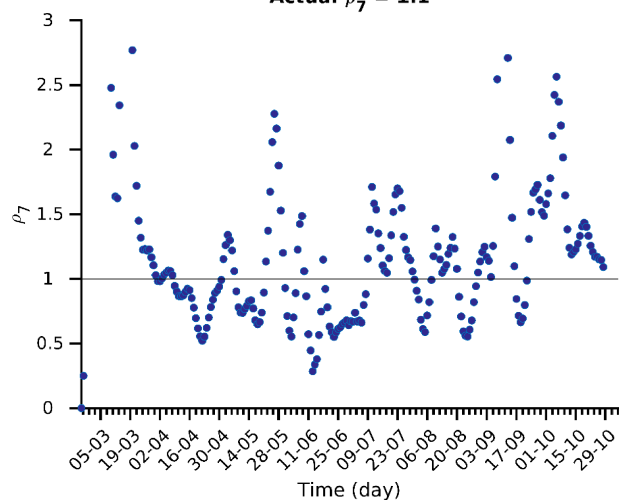
A ₁₄	EPG	CFR
37	40	2.00 %



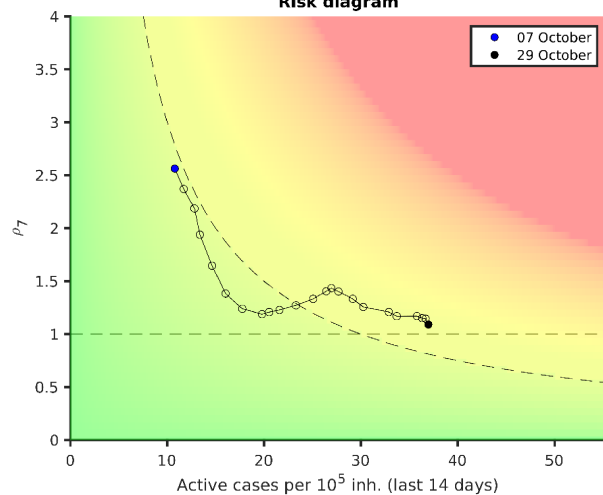
BIOCOM-Cov2 Degree = 5



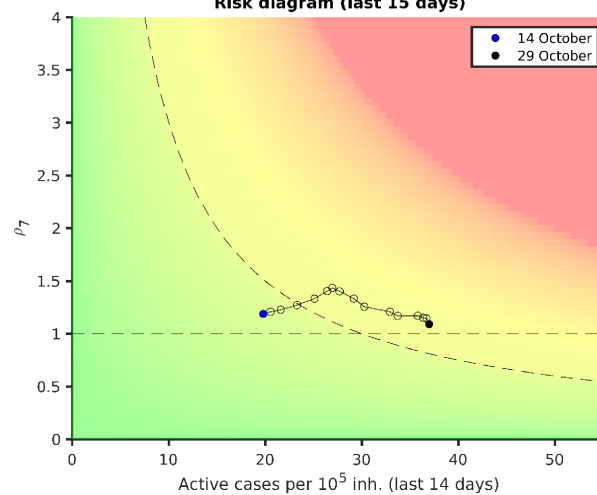
Actual $\rho_7 = 1.1$



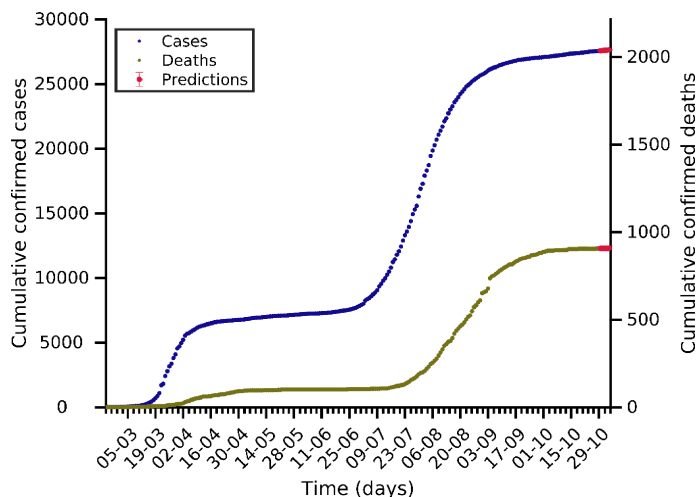
Risk diagram



Risk diagram (last 15 days)



Australia 29-10-2020. Pop: 25.5M. Cumulative incidence: 108/10⁵

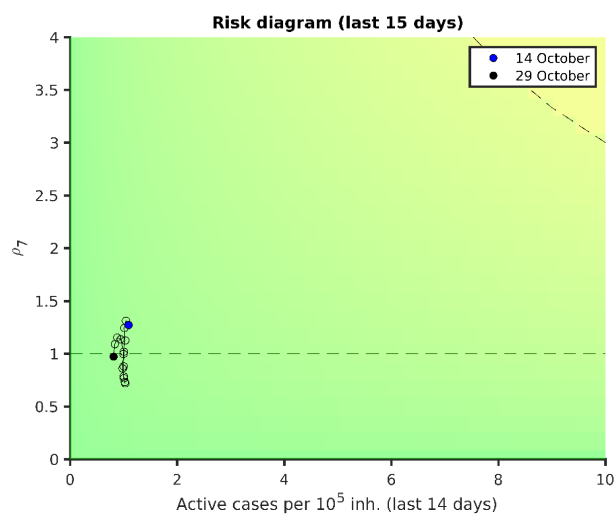
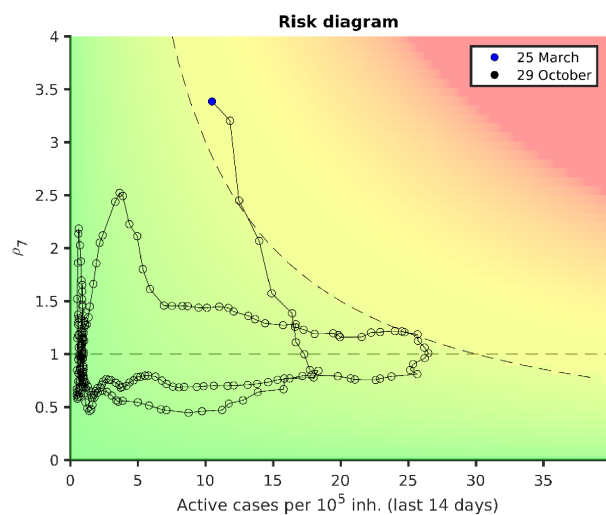
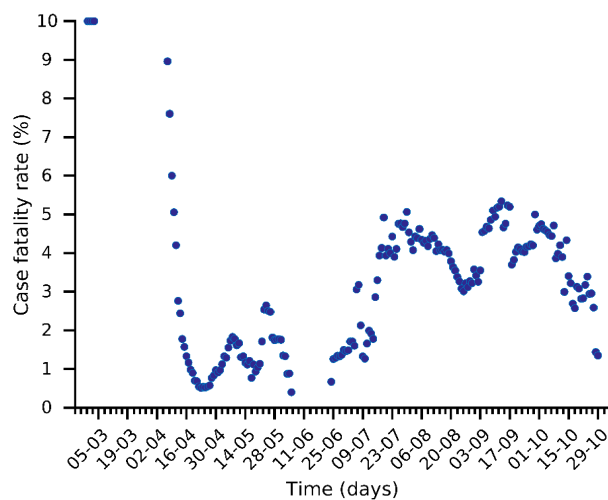
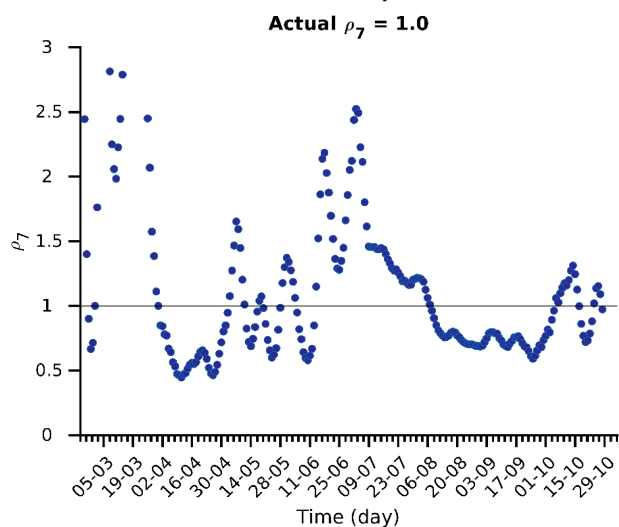
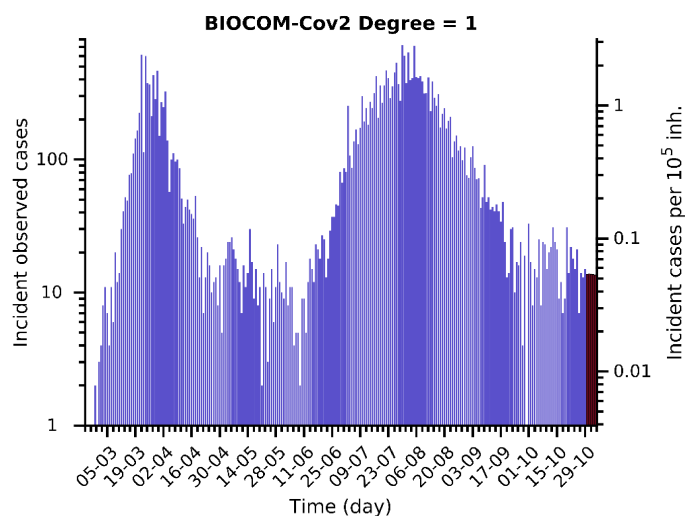
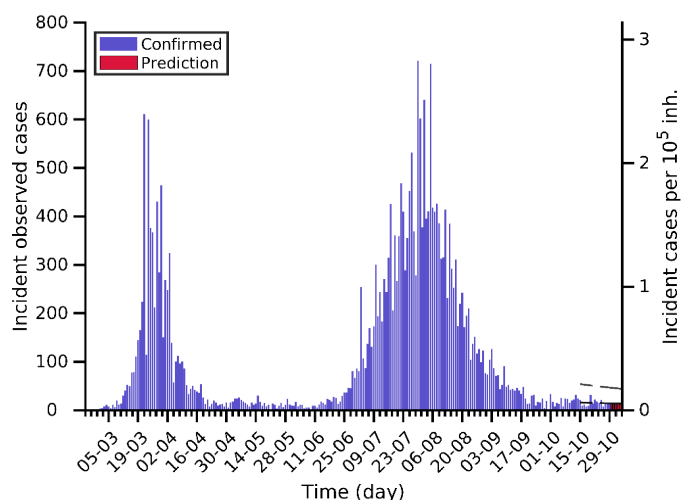


Predictions for next days

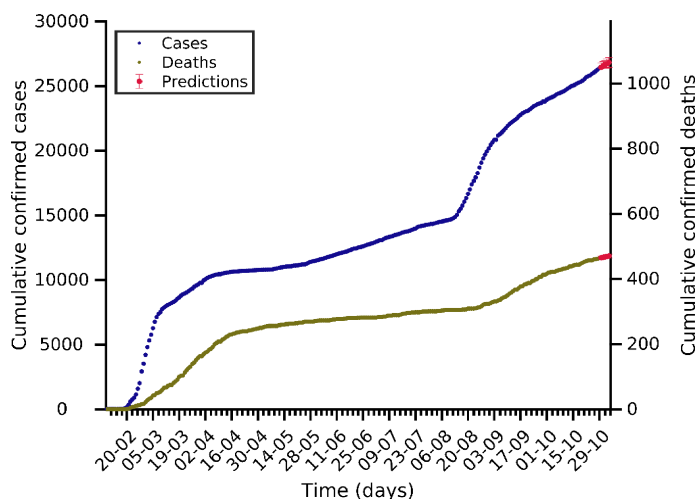
Day	Number of cases	95% Confidence Interval
30-10-2020	27583 (+14)	[27569 - 27614]
01-11-2020	27610 (+14)	[27578 - 27643]
03-11-2020	27637 (+14)	[27603 - 27672]

Current indicators

A ₁₄	EPG	CFR
1	1	1.35 %



South Korea 29-10-2020. Pop: 51.3M. Cumulative incidence: 51/10⁵

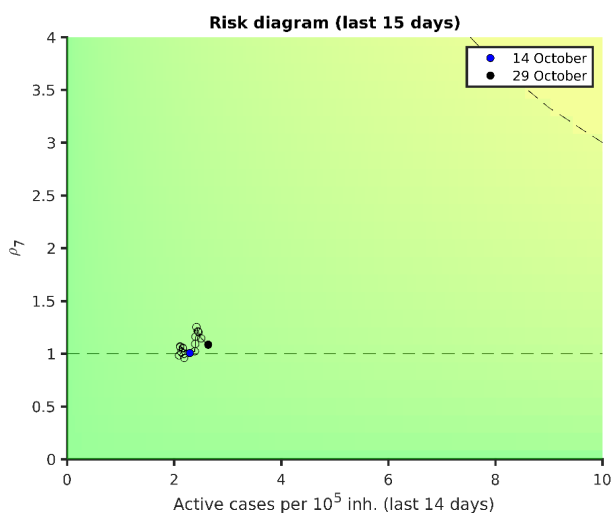
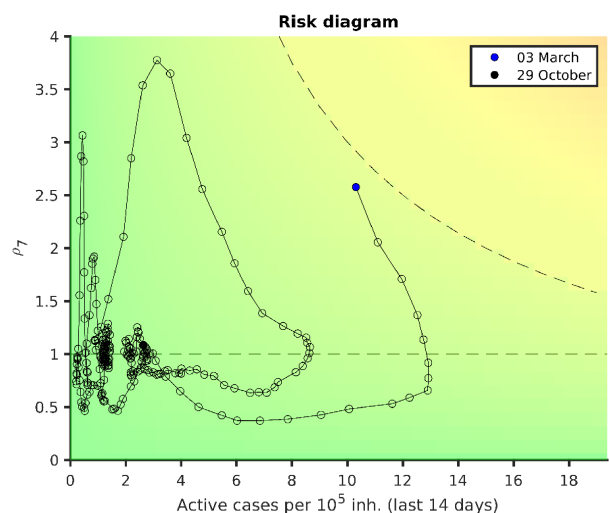
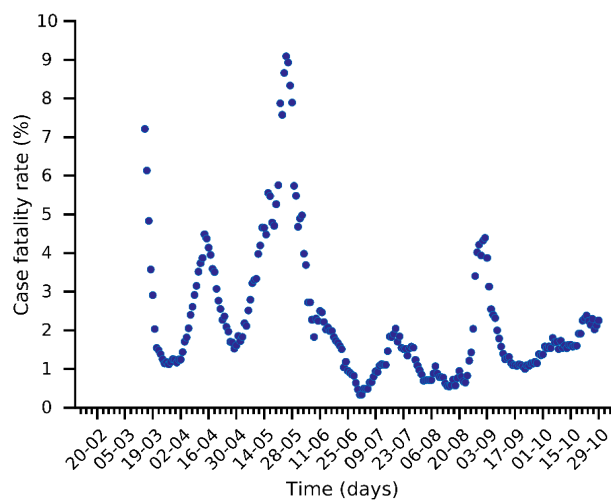
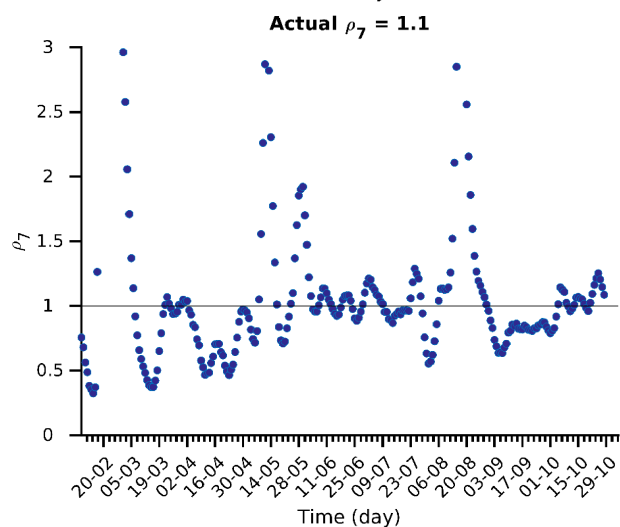
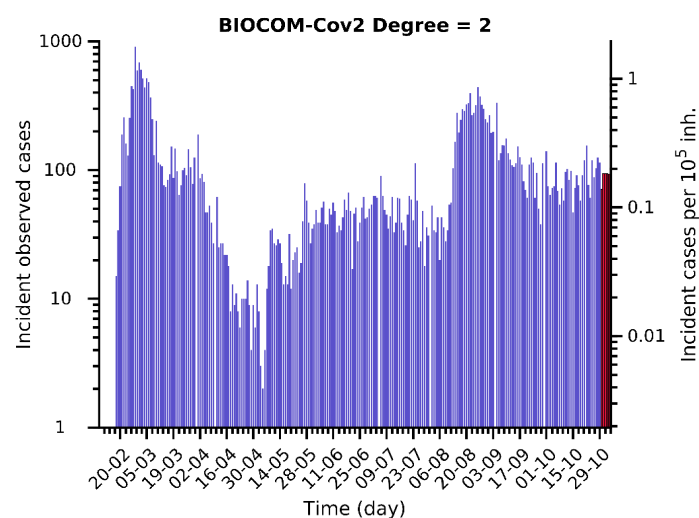
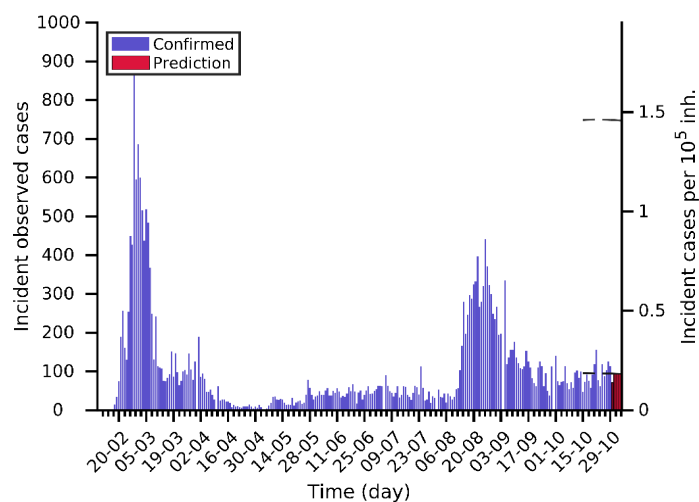


Predictions for next days

Day	Number of cases	95% Confidence Interval
30-10-2020	26456 (+71)	[26385 - 26792]
01-11-2020	26644 (+94)	[26385 - 26992]
03-11-2020	26831 (+94)	[26454 - 27207]

Current indicators

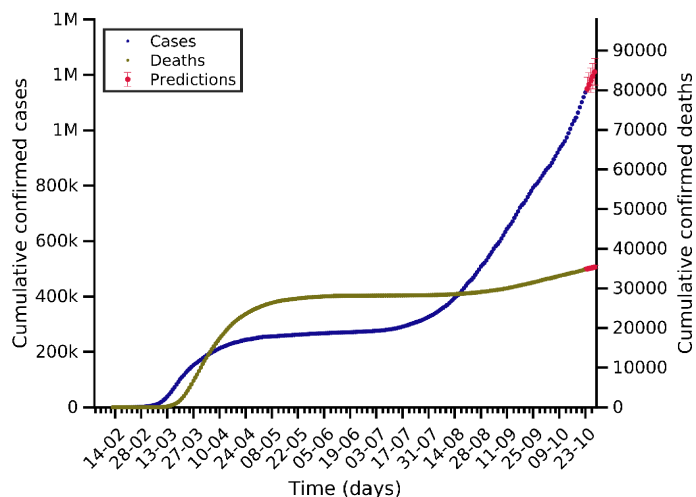
A ₁₄	EPG	CFR
3	3	2.25 %



(3) Analysis and prediction of COVID-19 for Spain and its regions

¹ <https://ai.facebook.com/research/publications/neural-relational-autoregression-for-high-resolution-covid-19-forecasting/>

Spain 23-10-2020. Pop: 47.0M. Cumulative incidence: 2417/10⁵

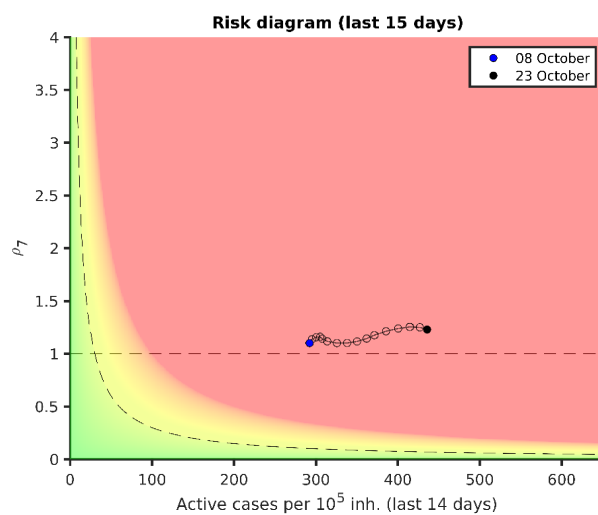
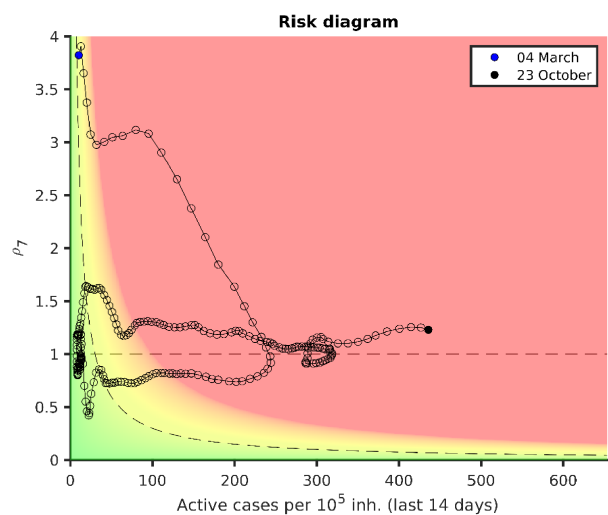
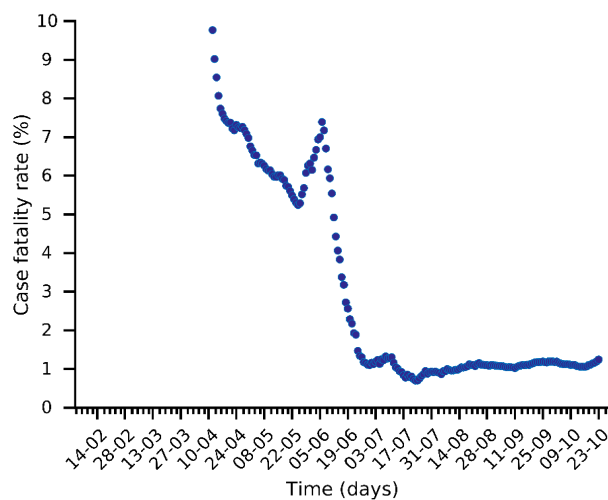
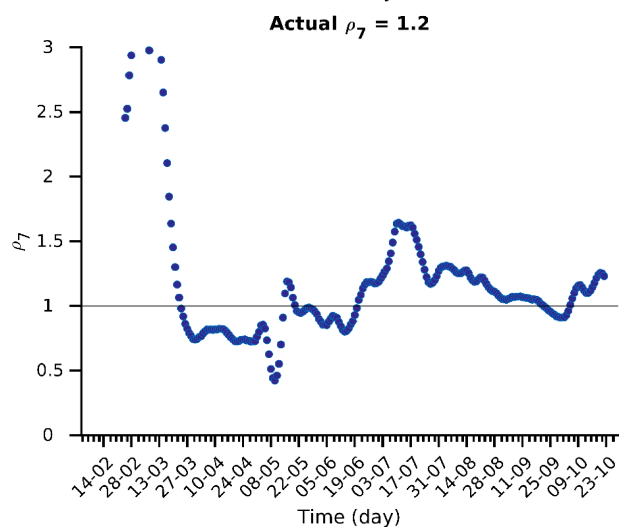
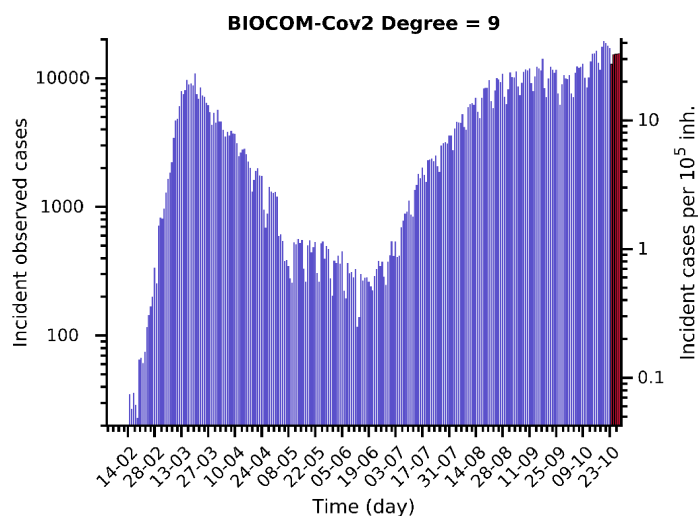
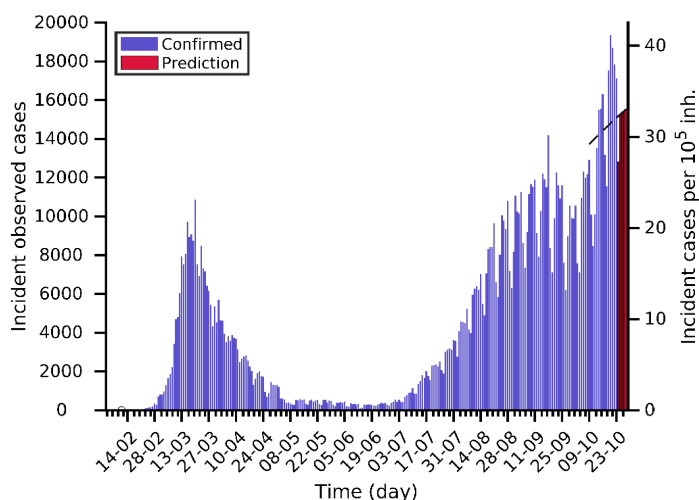


Predictions for next days

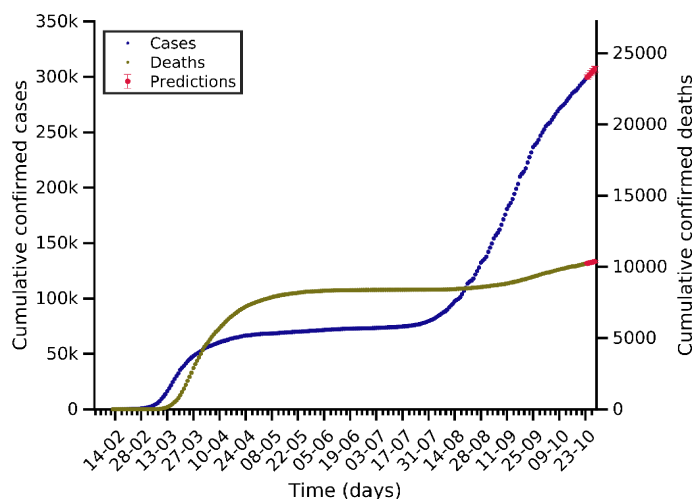
Day	Number of cases	95% Confidence Interval
24-10-2020	1149579 (+12815)	[1136764 - 1191873]
26-10-2020	1180193 (+15351)	[1136764 - 1224281]
28-10-2020	1211157 (+15526)	[1163117 - 1259197]

Current indicators

A ₁₄	EPG	CFR
436	536	1.24 %



Madrid 23-10-2020. Pop: 6.7M. Cumulative incidence: 4470/10⁵

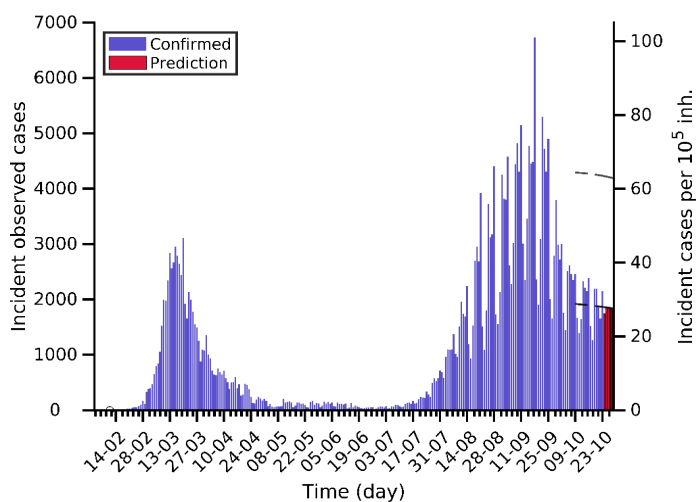


Predictions for next days

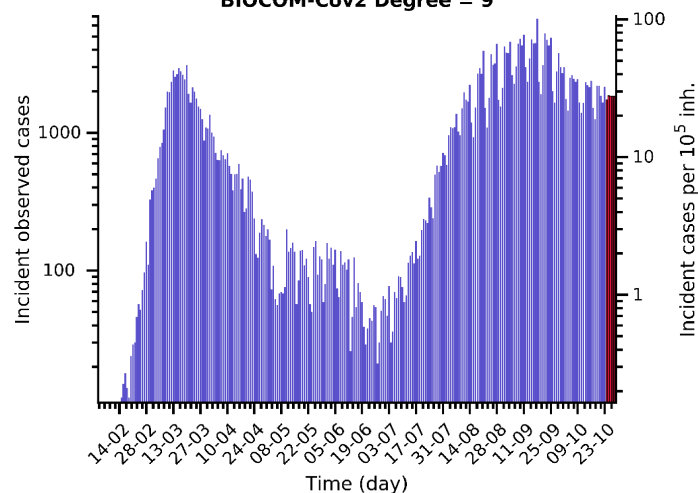
Day	Number of cases	95% Confidence Interval
24-10-2020	299615 (+1738)	[297877 - 301873]
26-10-2020	303323 (+1851)	[300977 - 305668]
28-10-2020	307011 (+1842)	[304479 - 309542]

Current indicators

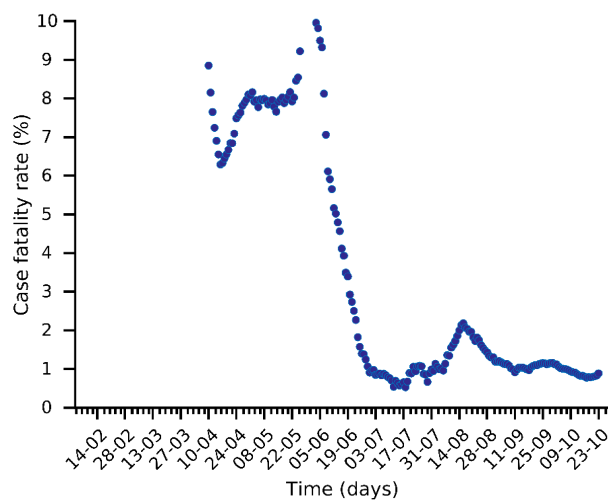
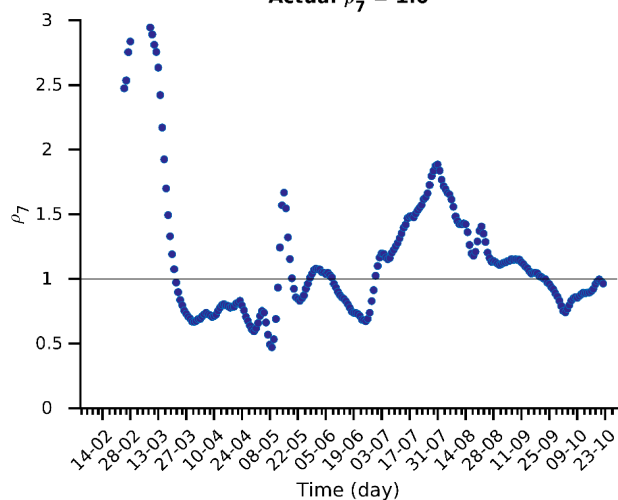
A ₁₄	EPG	CFR
399	385	0.89 %



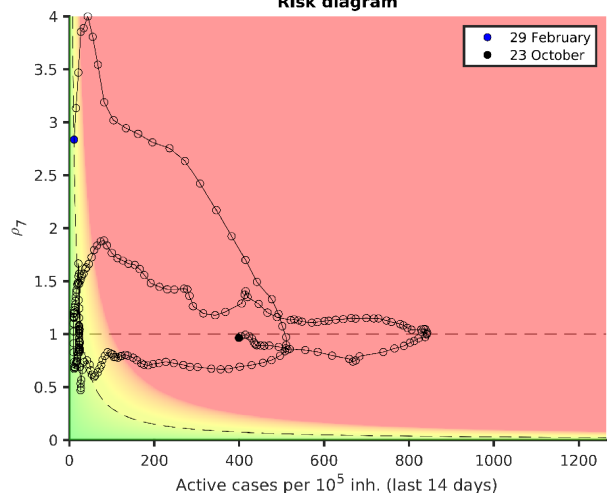
BIOCOM-Cov2 Degree = 9



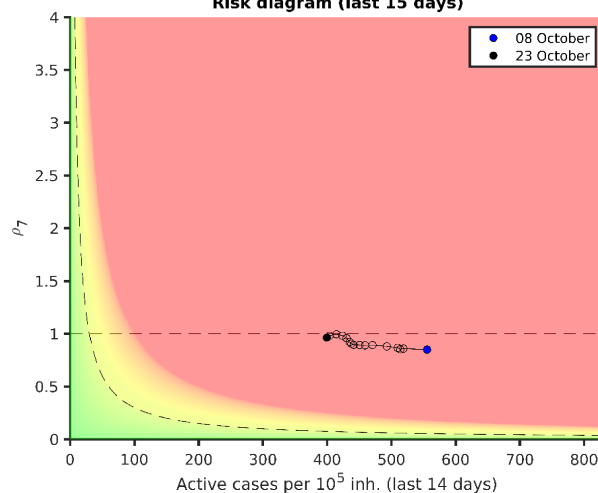
Actual $\rho_7 = 1.0$



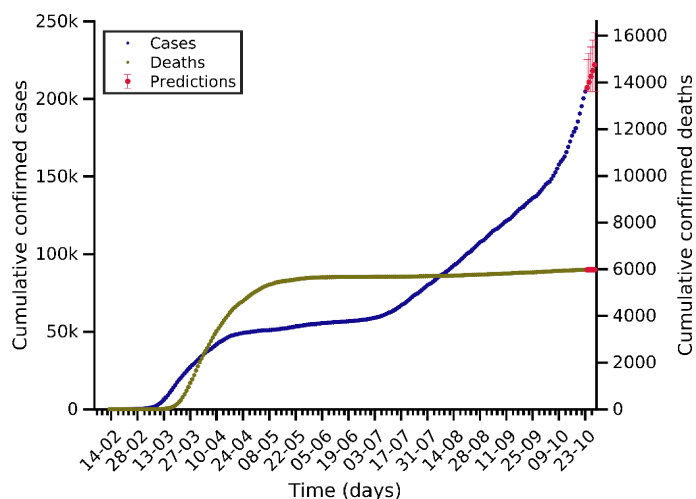
Risk diagram



Risk diagram (last 15 days)



Catalunya 23-10-2020. Pop: 7.7M. Cumulative incidence: 2669/10⁵

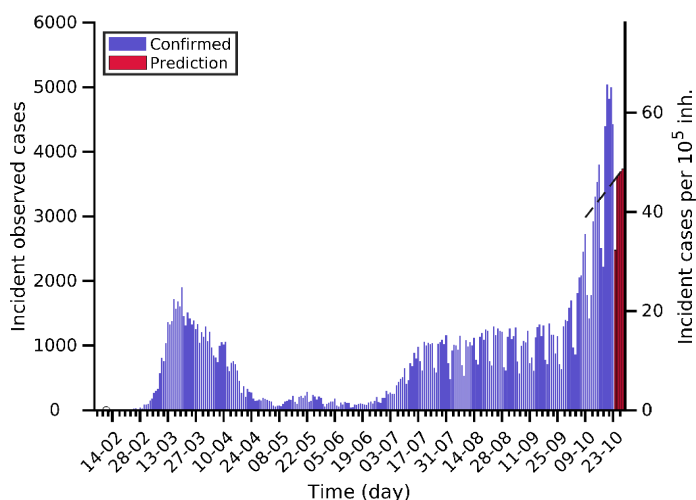


Predictions for next days

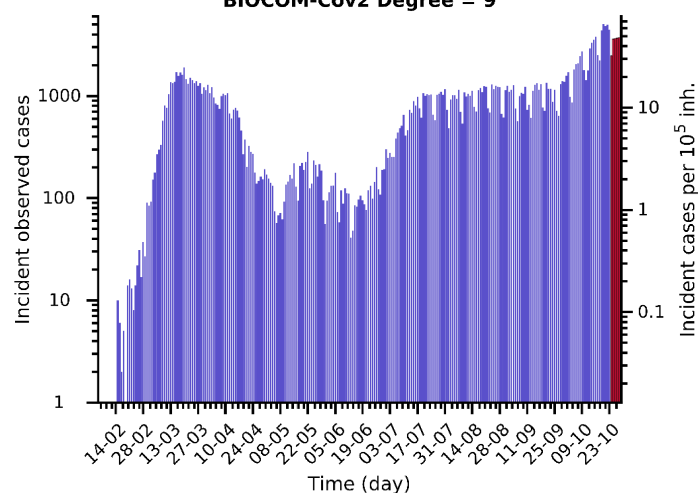
Day	Number of cases	95% Confidence Interval
24-10-2020	207321 (+2478)	[204843 - 225441]
26-10-2020	214587 (+3653)	[204843 - 233520]
28-10-2020	222015 (+3734)	[204843 - 242774]

Current indicators

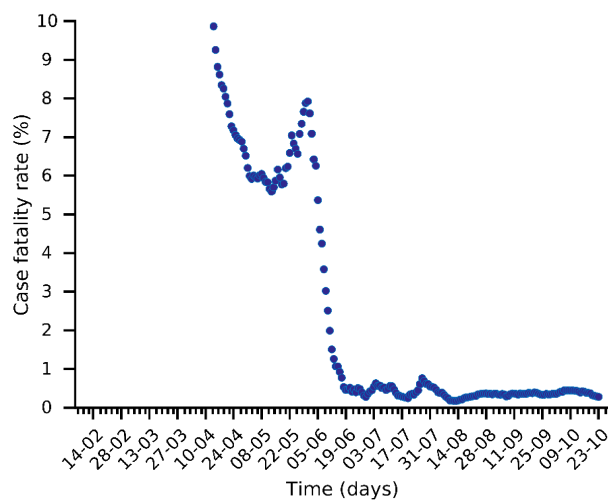
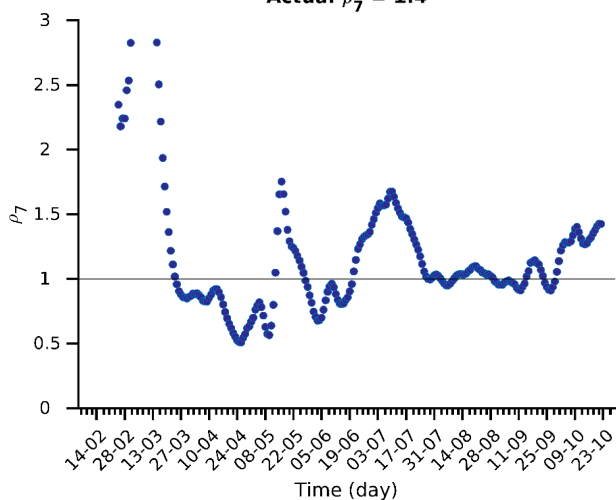
A ₁₄	EPG	CFR
612	872	0.28 %



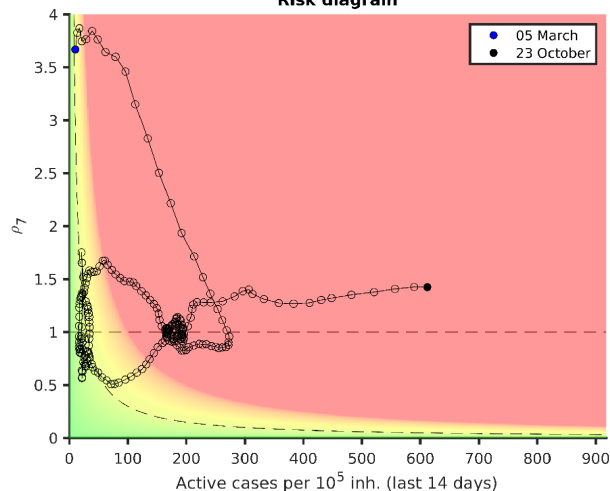
BIOCOM-Cov2 Degree = 9



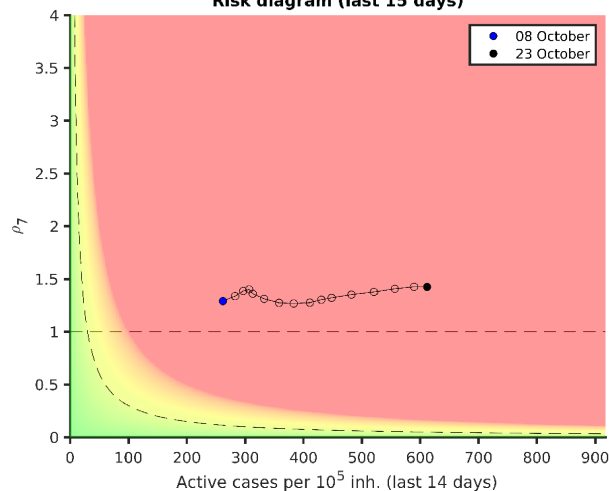
Actual $\rho_7 = 1.4$



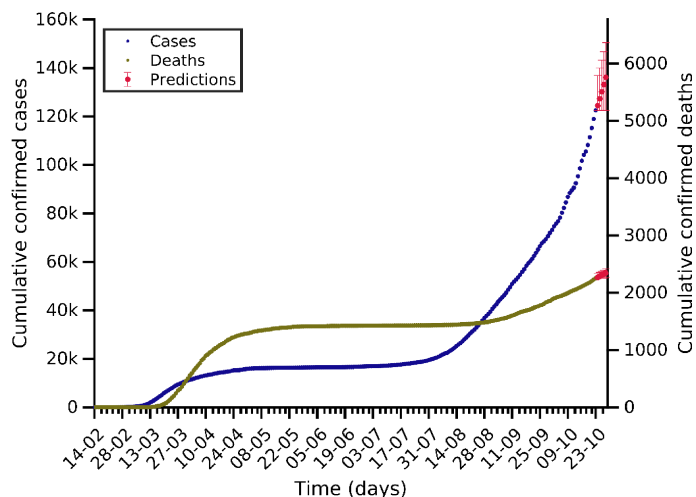
Risk diagram



Risk diagram (last 15 days)



Andalucia 23-10-2020. Pop: 8.4M. Cumulative incidence: 1456/10⁵

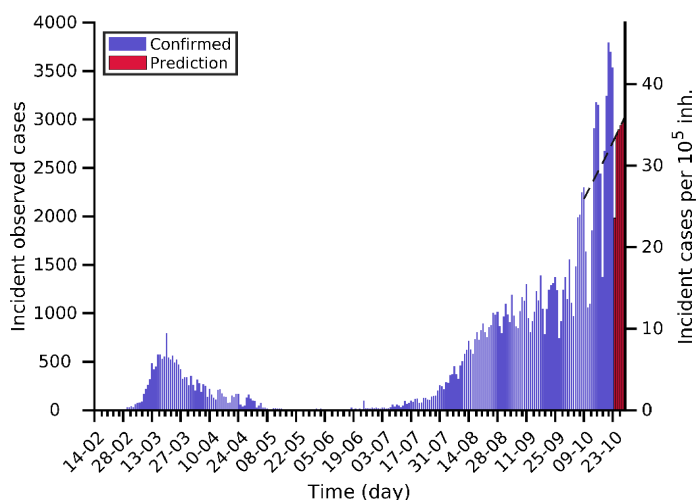


Predictions for next days

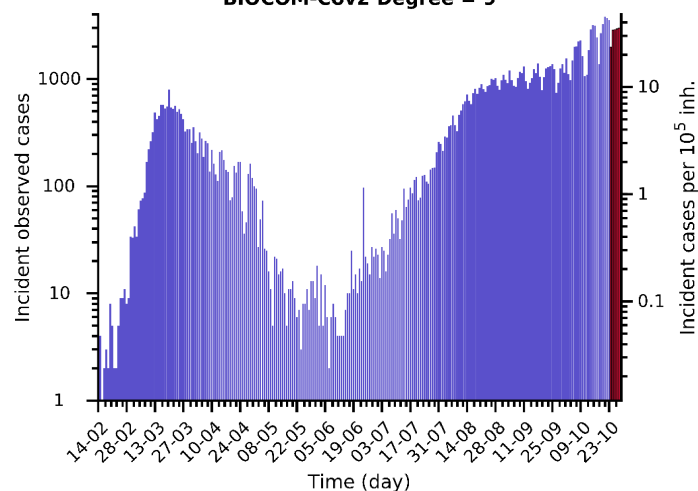
Day	Number of cases	95% Confidence Interval
24-10-2020	124459 (+1981)	[122478 - 136890]
26-10-2020	130204 (+2894)	[122478 - 143221]
28-10-2020	136125 (+2983)	[122478 - 150488]

Current indicators

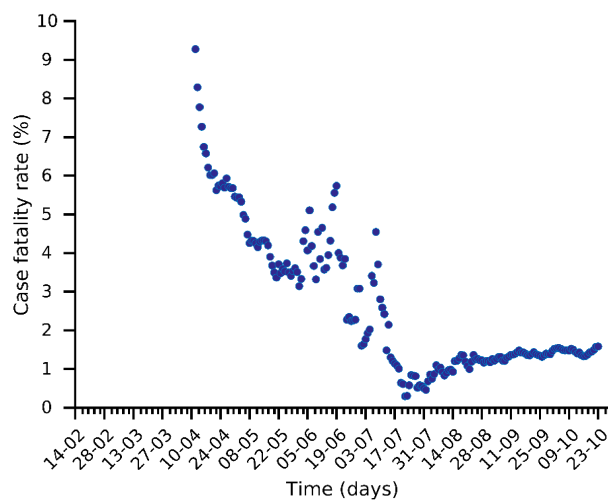
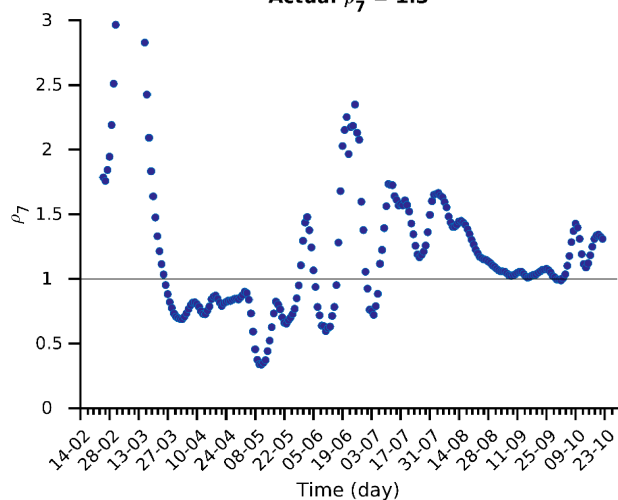
A ₁₄	EPG	CFR
424	555	1.58 %



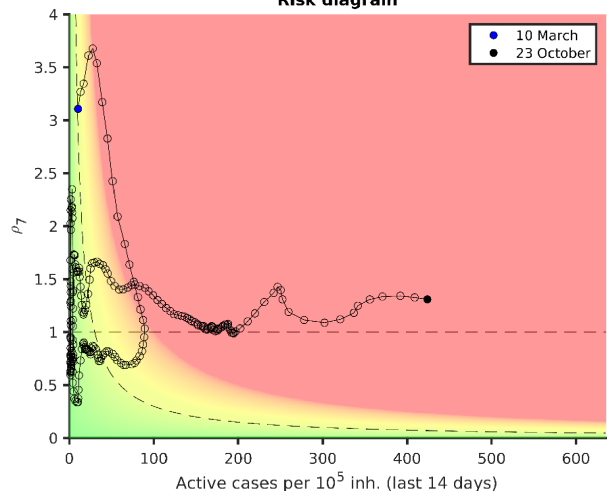
BIOCOM-Cov2 Degree = 9



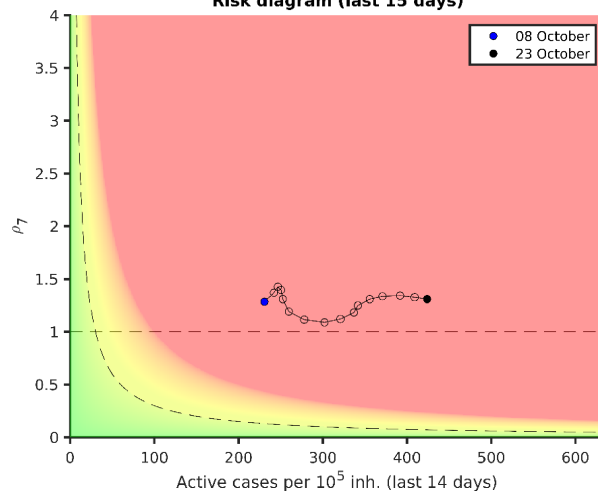
Actual $\rho_7 = 1.3$



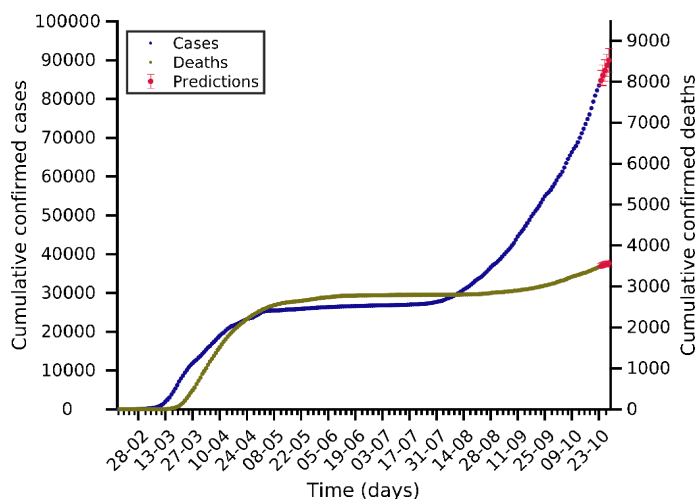
Risk diagram



Risk diagram (last 15 days)



Castilla Leon 23-10-2020. Pop: 2.4M. Cumulative incidence: 3480/10⁵

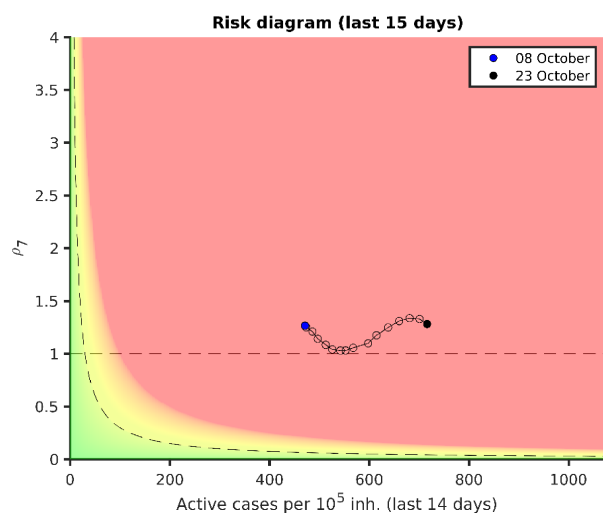
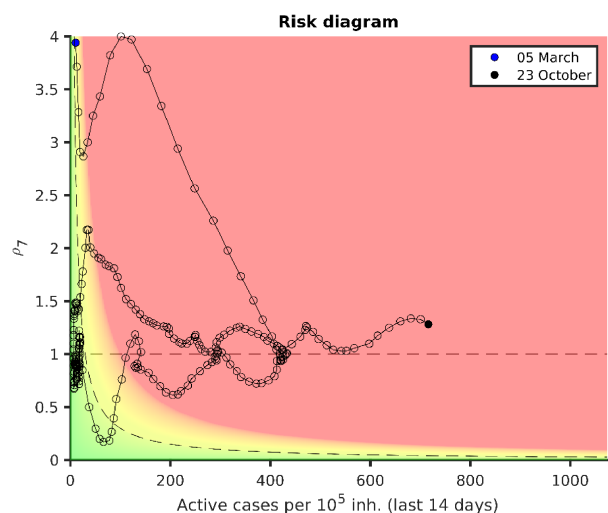
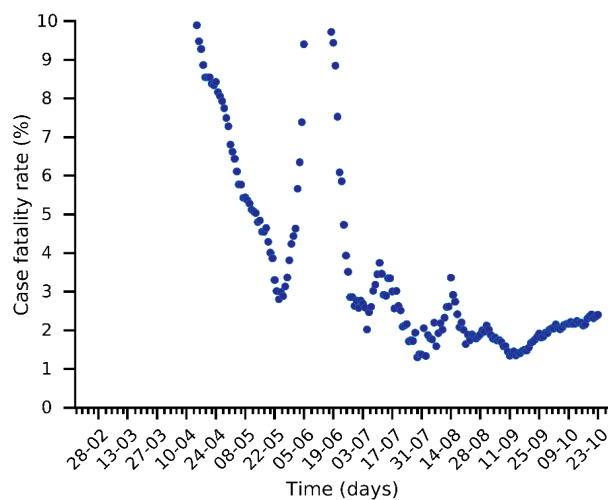
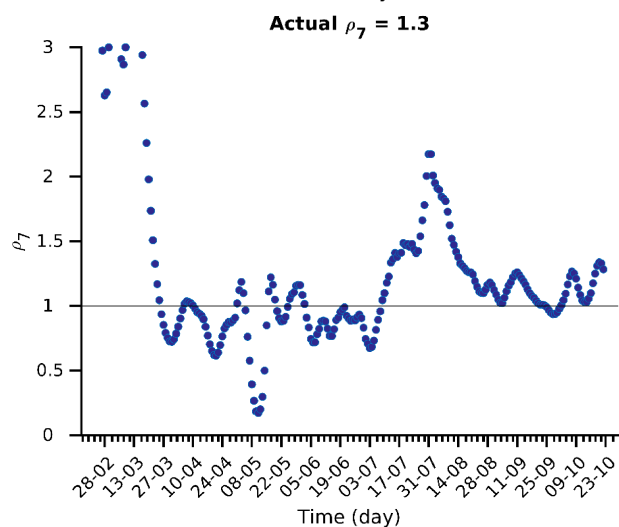
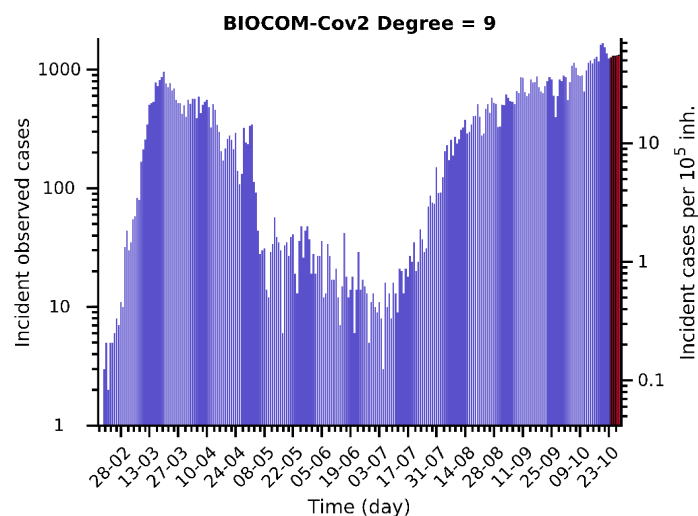
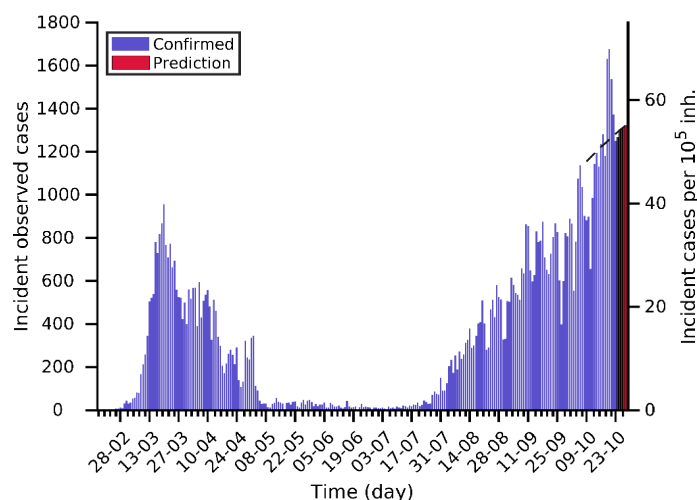


Predictions for next days

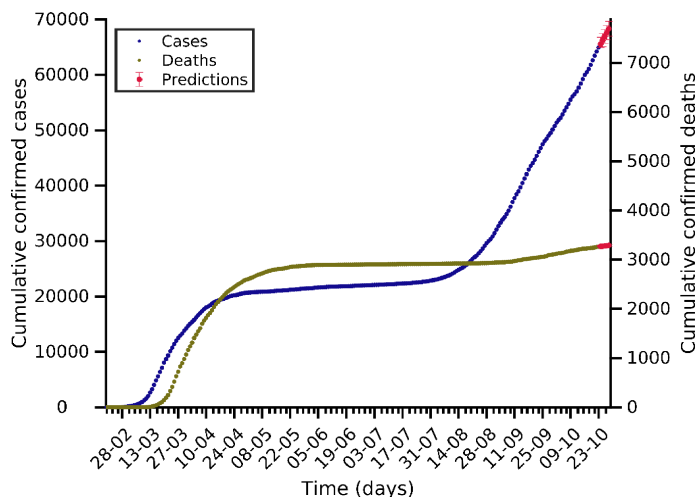
Day	Number of cases	95% Confidence Interval
24-10-2020	84763 (+1267)	[83496 - 87417]
26-10-2020	87370 (+1308)	[84602 - 90138]
28-10-2020	90009 (+1323)	[86989 - 93029]

Current indicators

A ₁₄	EPG	CFR
716	918	2.40 %



Castilla-La Mancha 23-10-2020. Pop: 2.0M. Cumulative incidence: 3195/10⁵

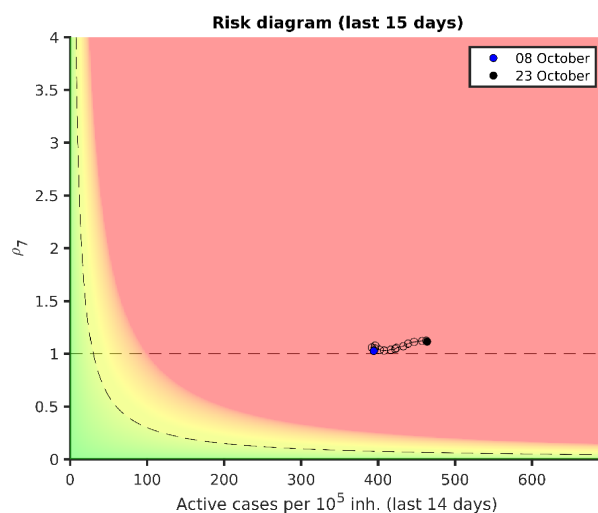
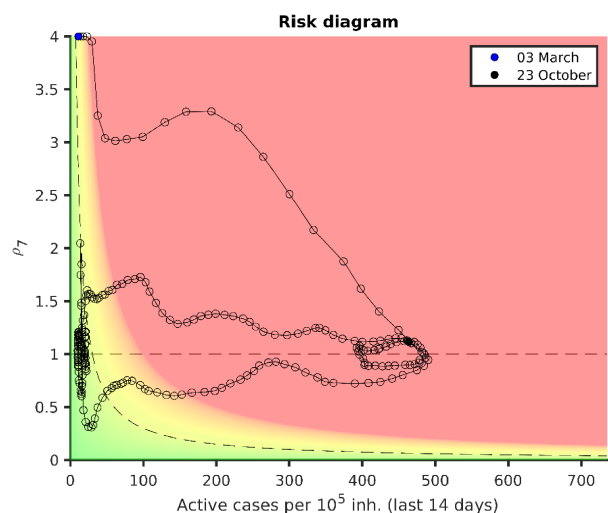
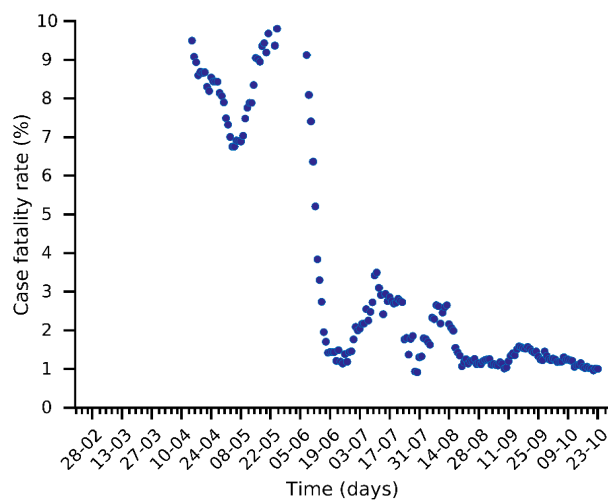
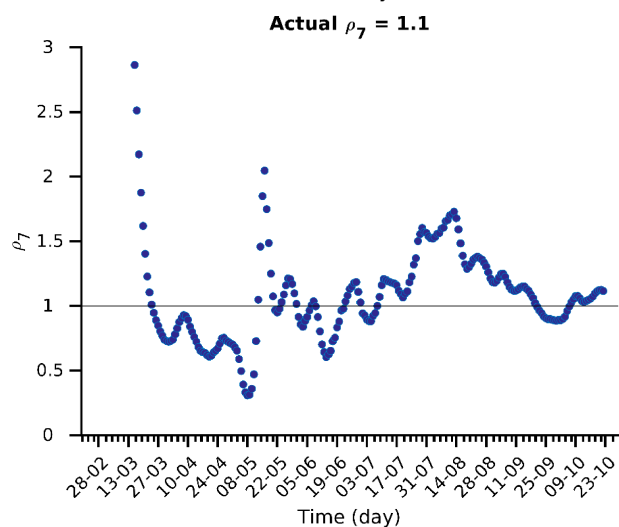
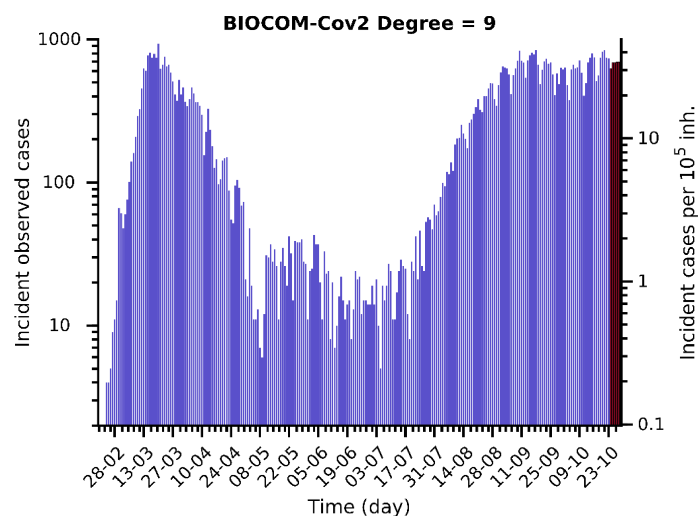
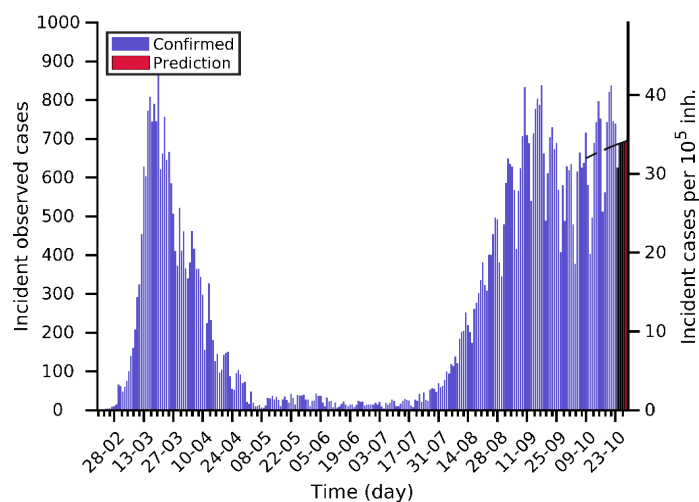


Predictions for next days

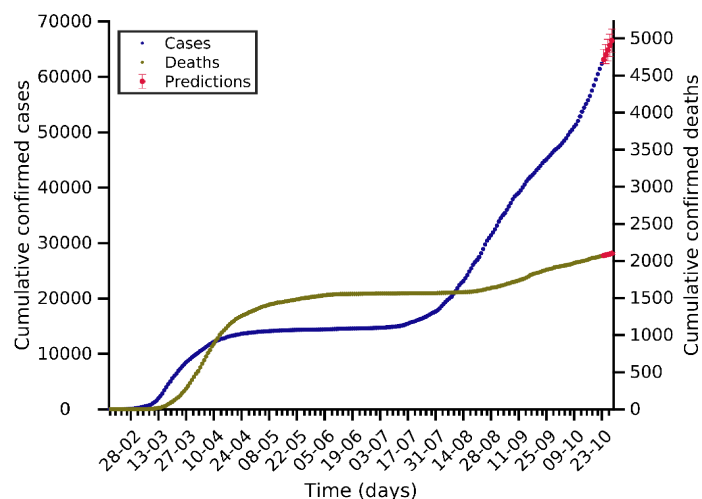
Day	Number of cases	95% Confidence Interval
24-10-2020	65571 (+625)	[64946 - 66753]
26-10-2020	66949 (+690)	[65720 - 68179]
28-10-2020	68335 (+694)	[67000 - 69671]

Current indicators

A ₁₄	EPG	CFR
464	517	1.00 %



Euskadi 23-10-2020. Pop: 2.2M. Cumulative incidence: 2825/10⁵

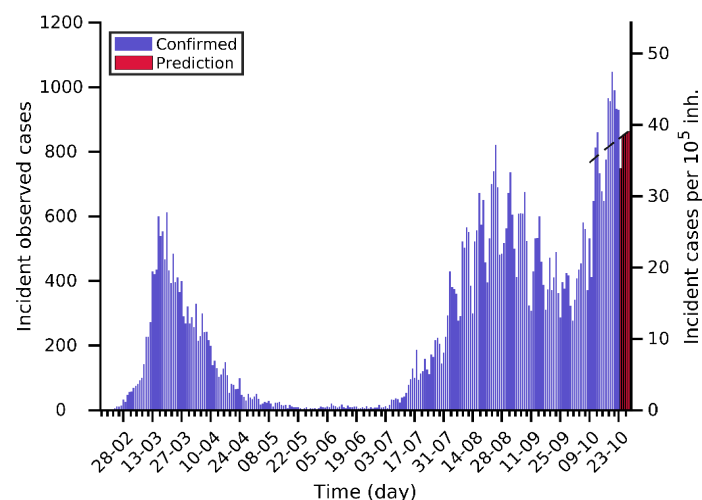


Predictions for next days

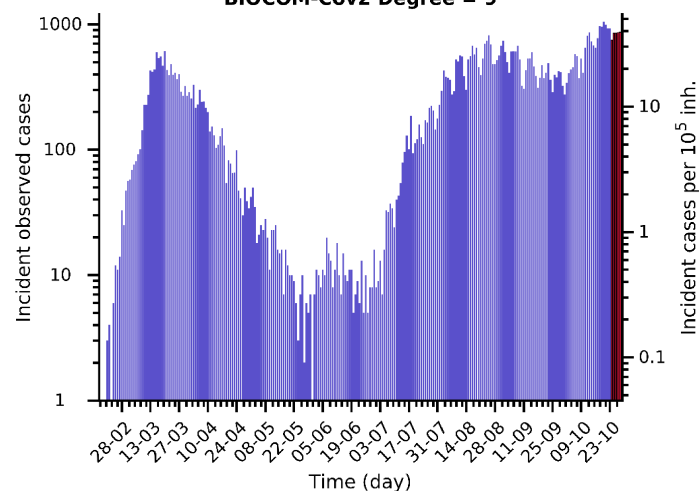
Day	Number of cases	95% Confidence Interval
24-10-2020	63125 (+748)	[62377 - 64977]
26-10-2020	64829 (+854)	[62899 - 66759]
28-10-2020	66551 (+863)	[64449 - 68654]

Current indicators

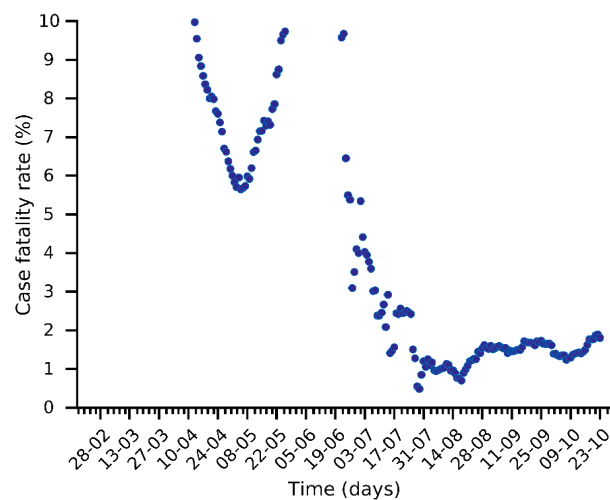
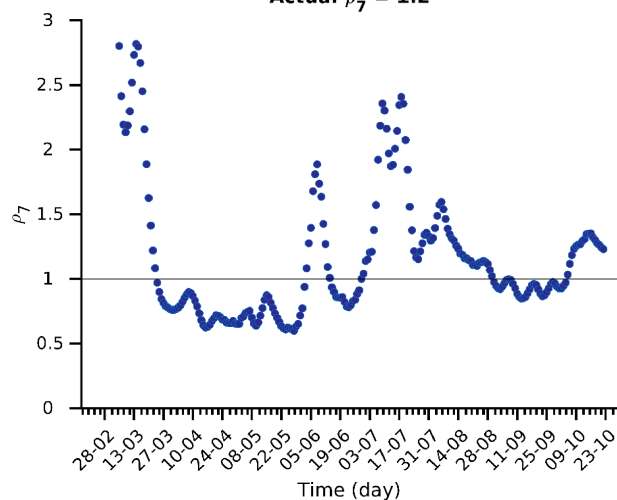
A ₁₄	EPG	CFR
516	635	1.80 %



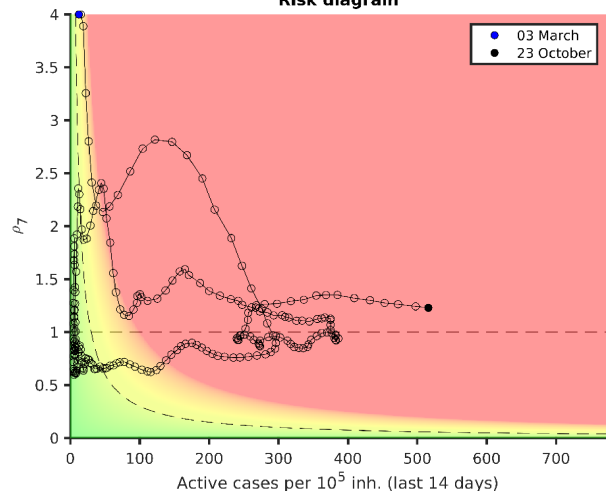
BIOCOM-Cov2 Degree = 9



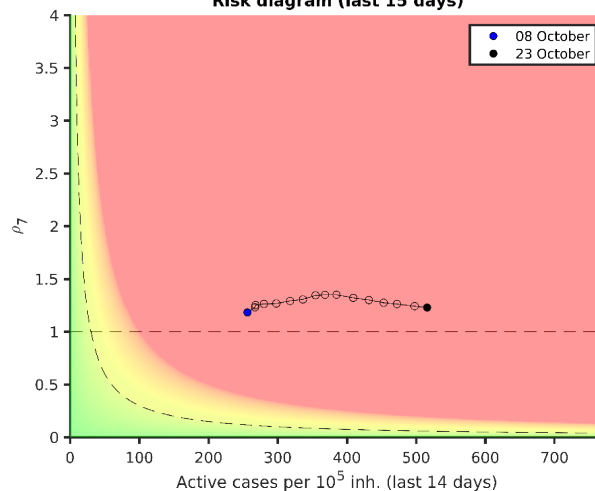
Actual $\rho_7 = 1.2$



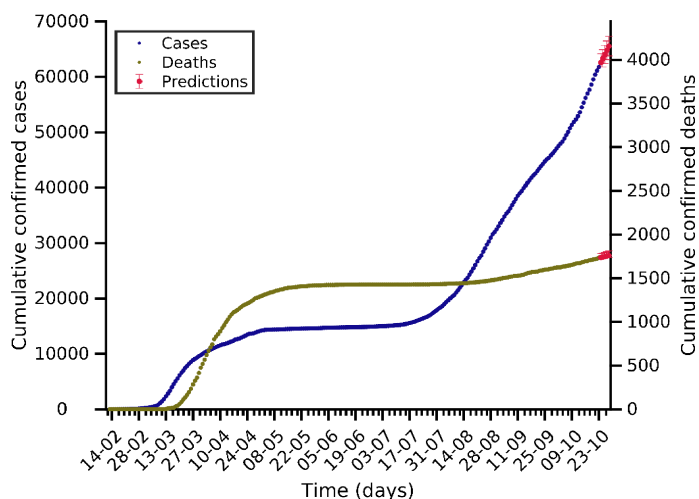
Risk diagram



Risk diagram (last 15 days)



C Valenciana 23-10-2020. Pop: 5.0M. Cumulative incidence: 1235/10⁵

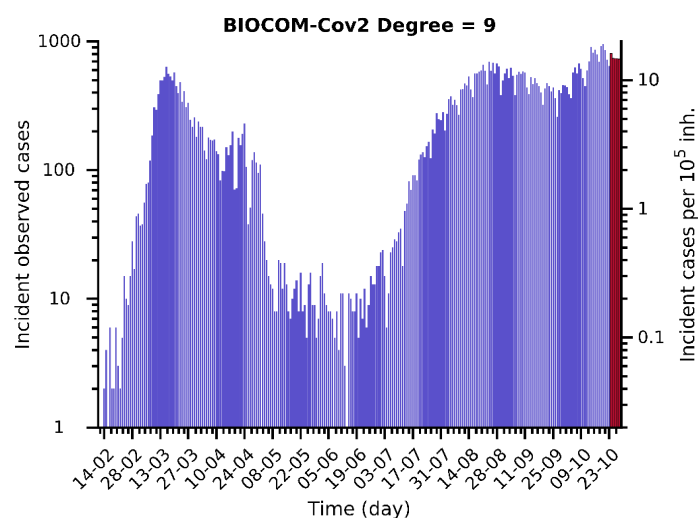
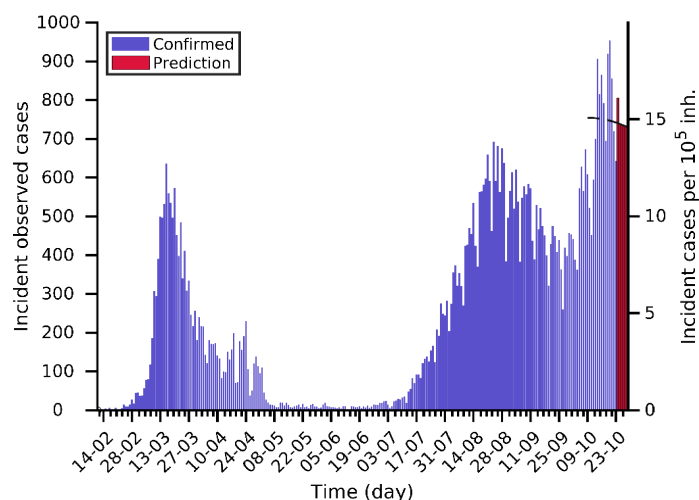


Predictions for next days

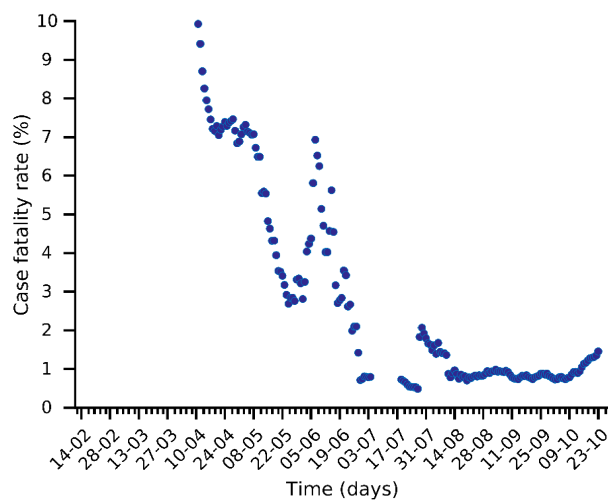
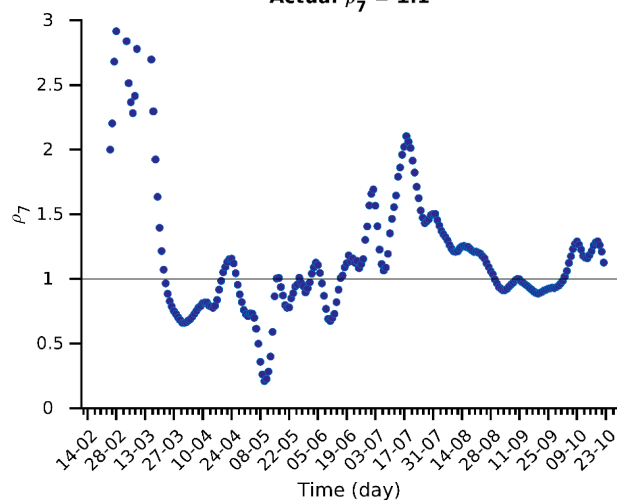
Day	Number of cases	95% Confidence Interval
24-10-2020	62583 (+805)	[61778 - 64156]
26-10-2020	64058 (+737)	[62423 - 65693]
28-10-2020	65525 (+732)	[63756 - 67293]

Current indicators

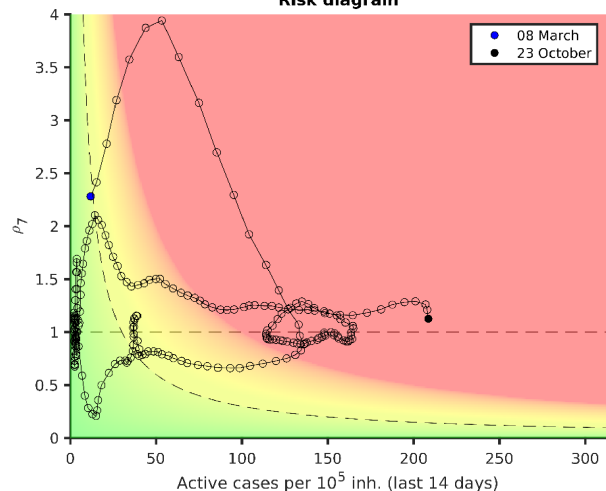
A ₁₄	EPG	CFR
209	235	1.45 %



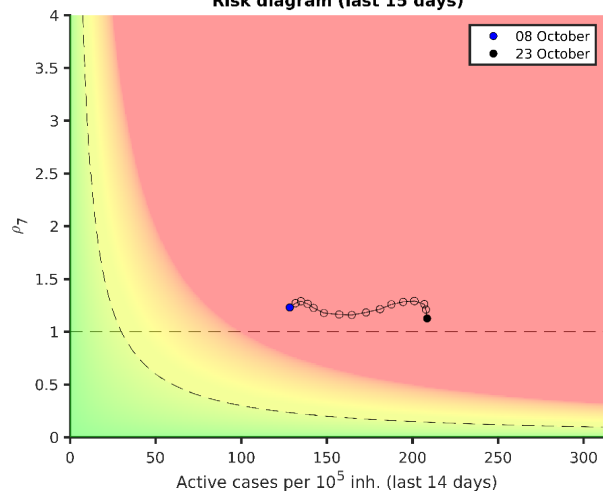
Actual $\rho_7 = 1.1$



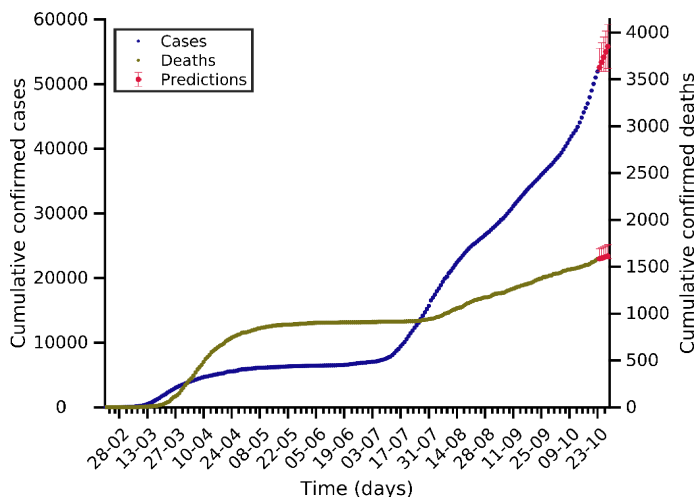
Risk diagram



Risk diagram (last 15 days)



Aragon 23-10-2020. Pop: 1.3M. Cumulative incidence: 3938/10⁵

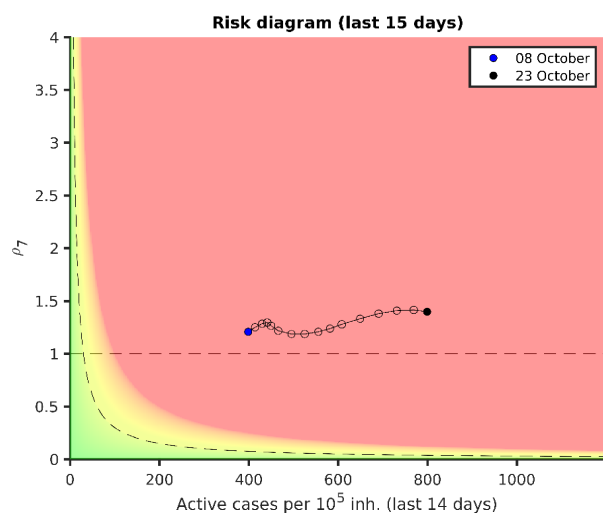
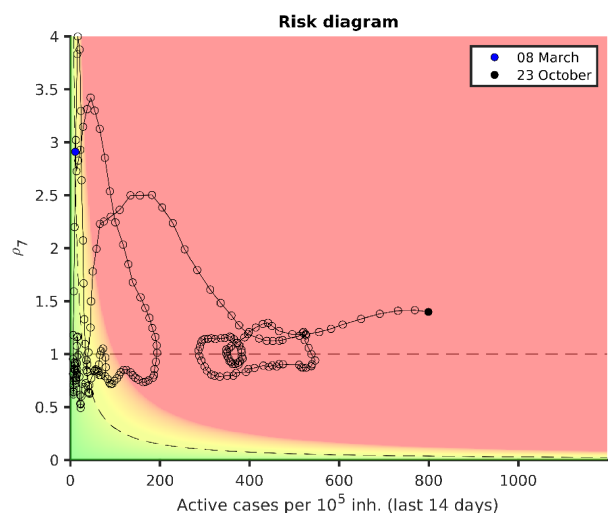
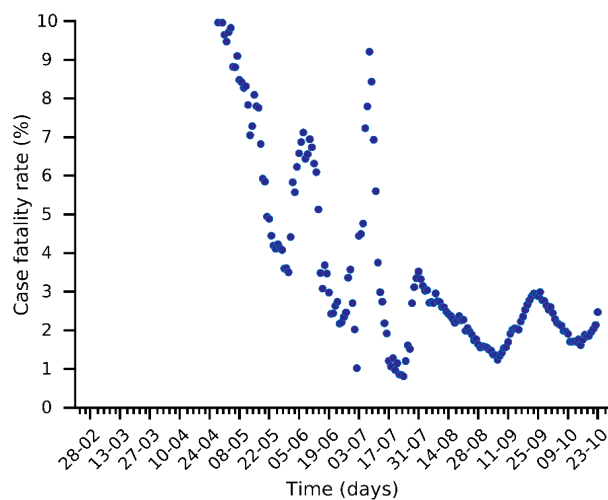
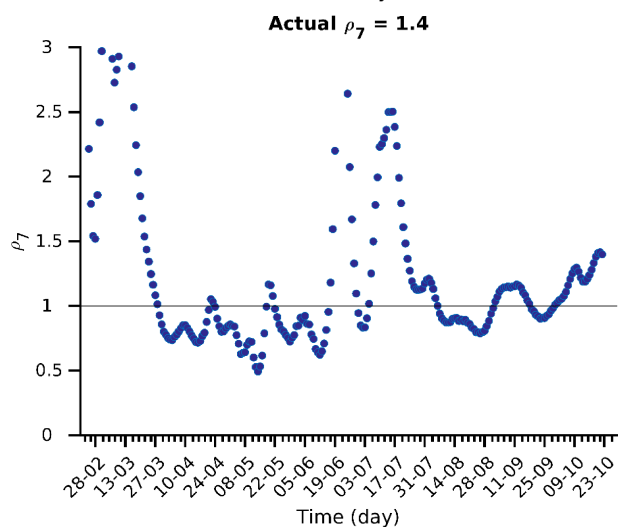
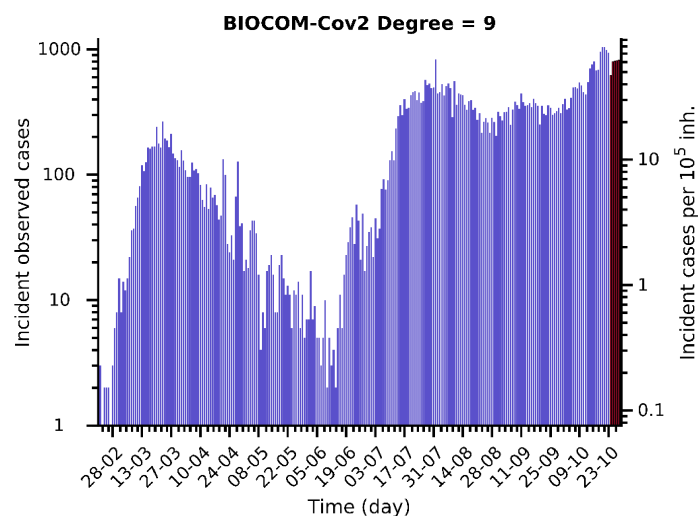
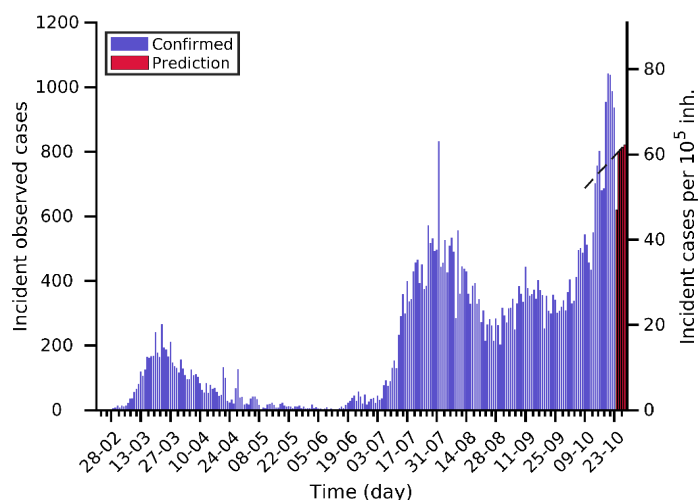


Predictions for next days

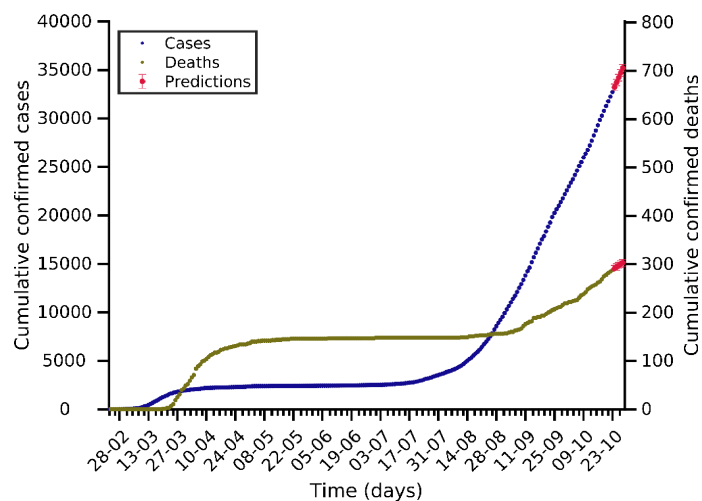
Day	Number of cases	95% Confidence Interval
24-10-2020	52578 (+620)	[51958 - 55555]
26-10-2020	54186 (+807)	[51958 - 57293]
28-10-2020	55822 (+821)	[52425 - 59219]

Current indicators

A ₁₄	EPG	CFR
799	1117	2.47 %



Murcia 23-10-2020. Pop: 1.5M. Cumulative incidence: 2191/10⁵

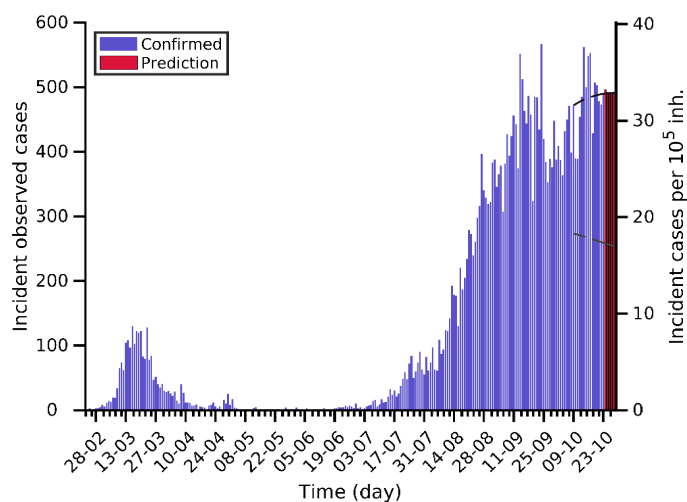


Predictions for next days

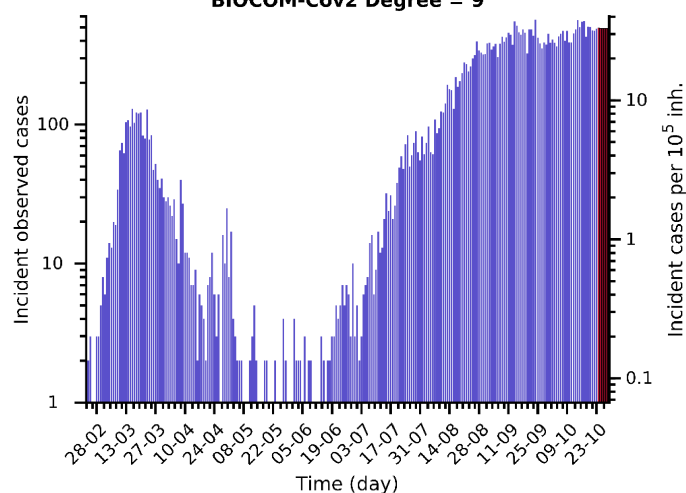
Day	Number of cases	95% Confidence Interval
24-10-2020	33225 (+496)	[32896 - 33554]
26-10-2020	34207 (+491)	[33864 - 34549]
28-10-2020	35189 (+491)	[34817 - 35561]

Current indicators

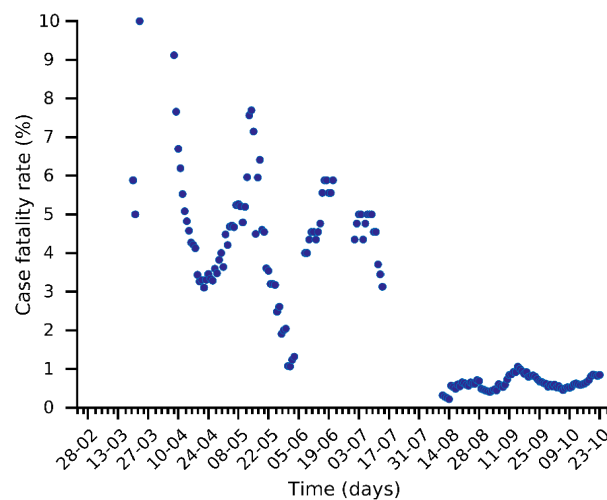
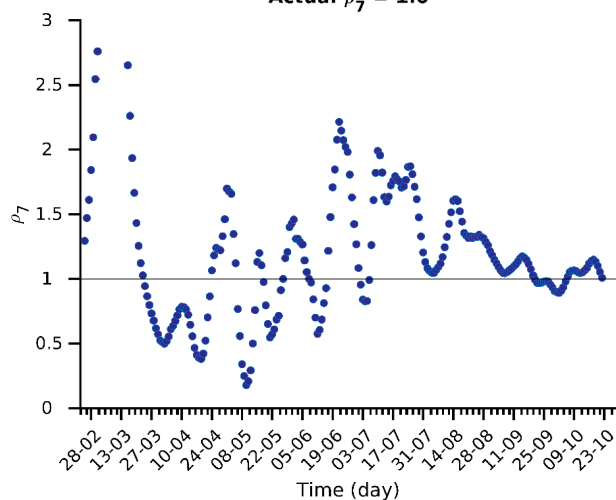
A ₁₄	EPG	CFR
452	456	0.84 %



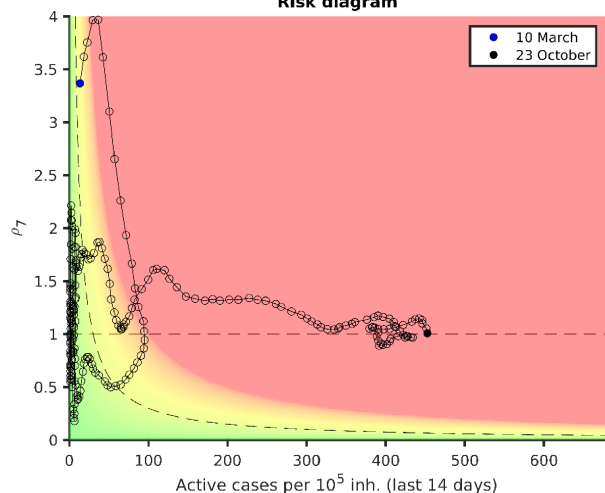
BIOCOM-Cov2 Degree = 9



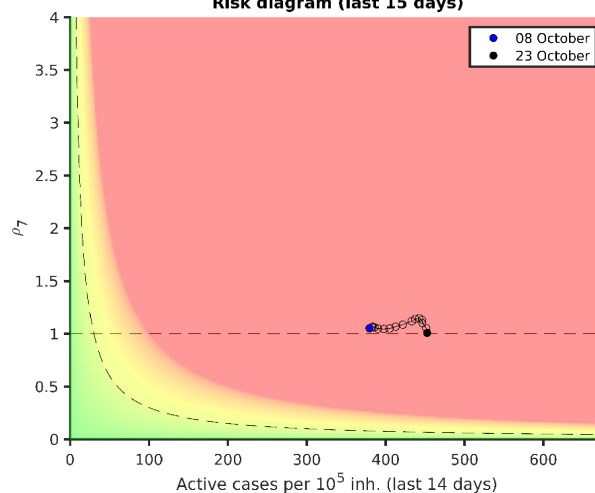
Actual $\rho_7 = 1.0$



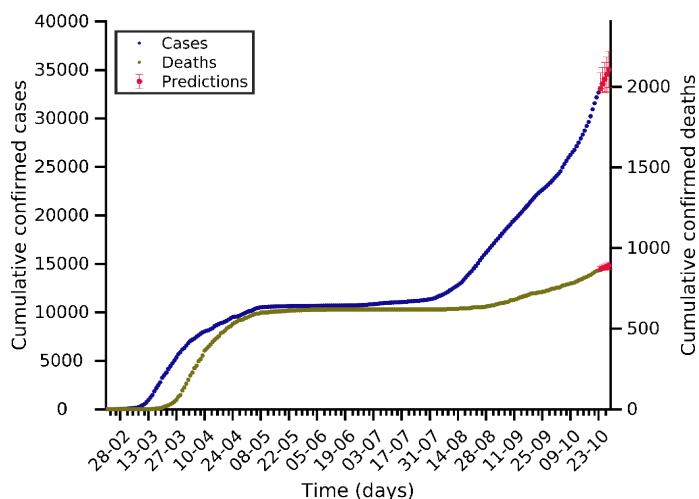
Risk diagram



Risk diagram (last 15 days)



Galicia 23-10-2020. Pop: 2.7M. Cumulative incidence: 1210/10⁵

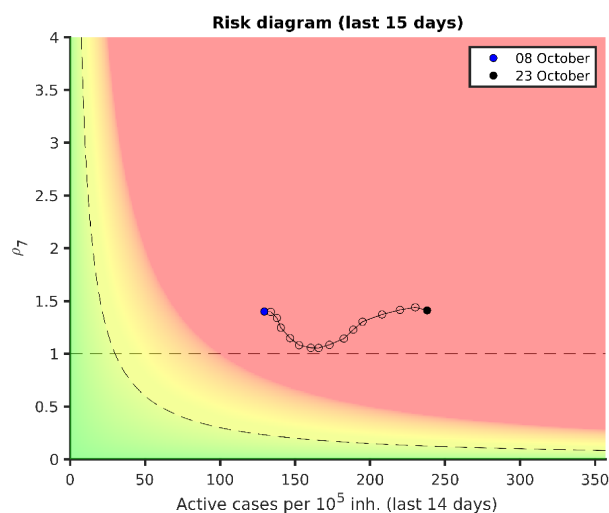
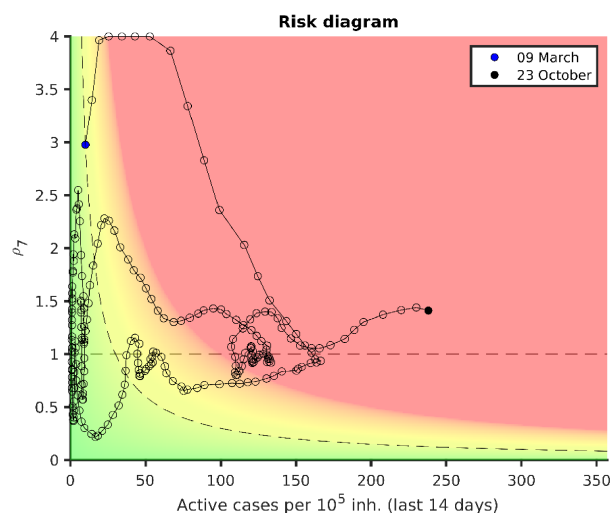
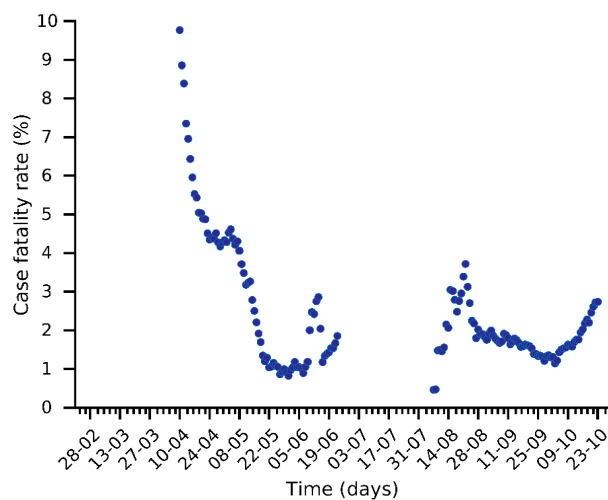
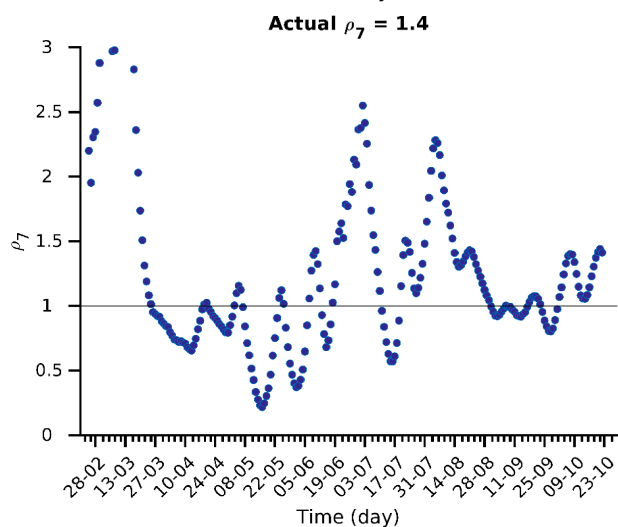
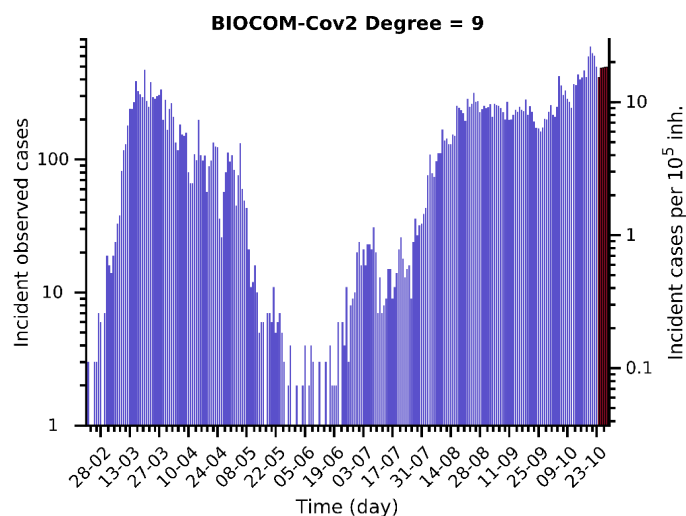
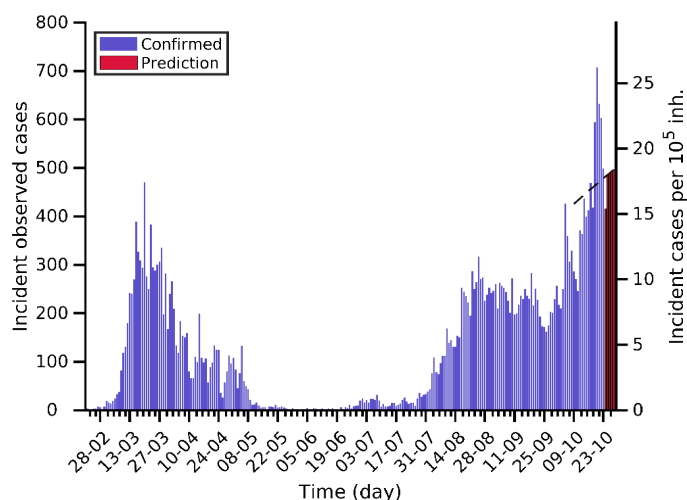


Predictions for next days

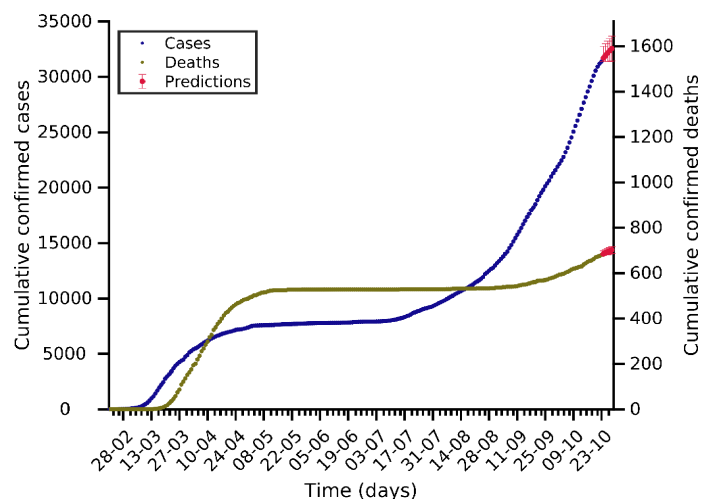
Day	Number of cases	95% Confidence Interval
24-10-2020	33085 (+415)	[32670 - 34727]
26-10-2020	34060 (+489)	[32670 - 35773]
28-10-2020	35049 (+496)	[33180 - 36919]

Current indicators

A ₁₄	EPG	CFR
238	336	2.74 %



Navarra 23-10-2020. Pop: 0.7M. Cumulative incidence: 4798/10⁵

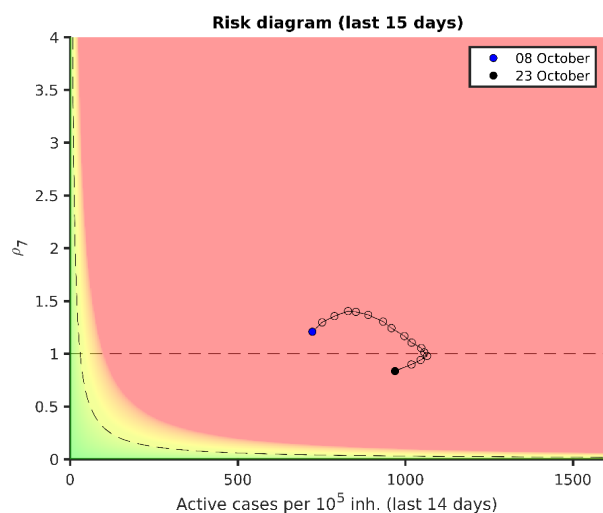
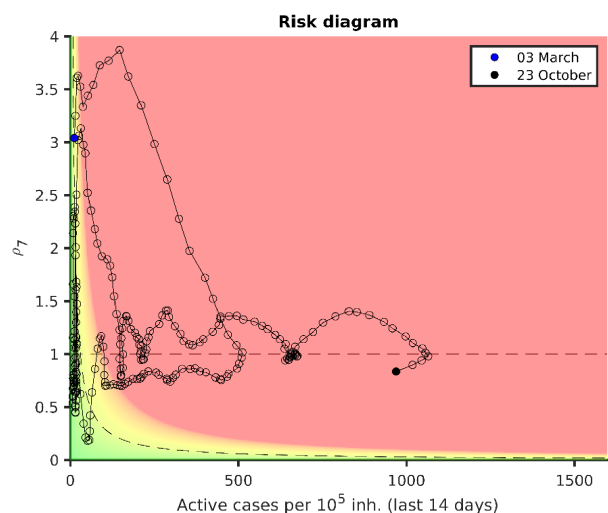
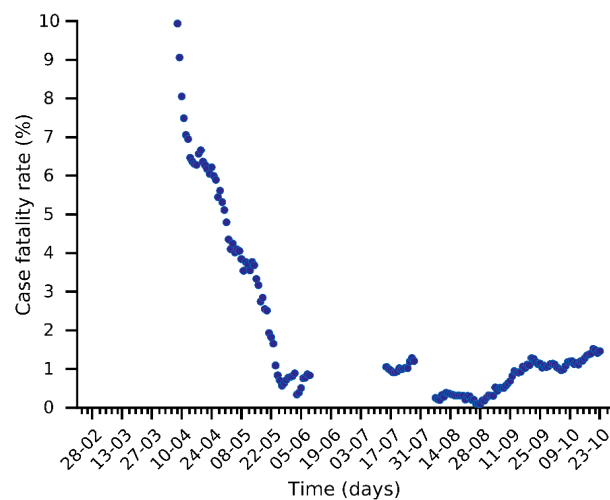
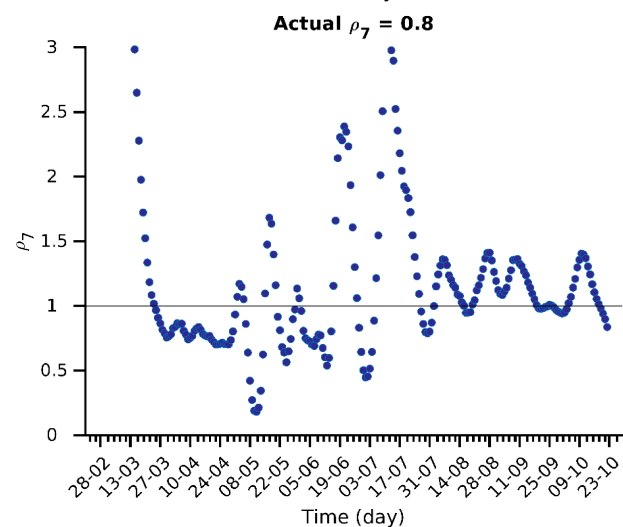
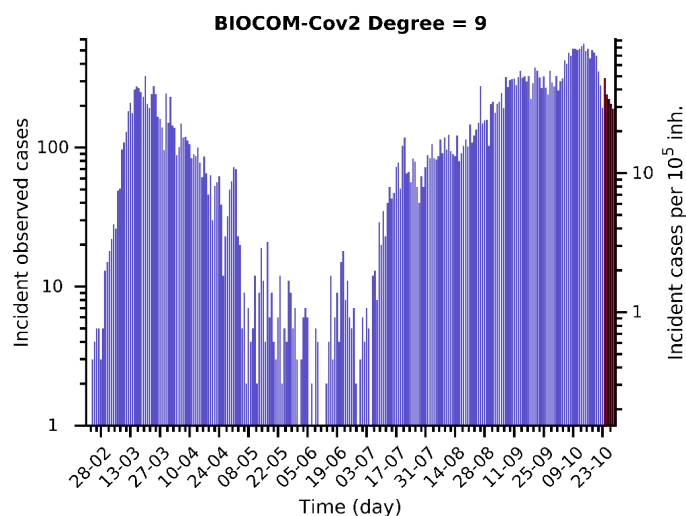
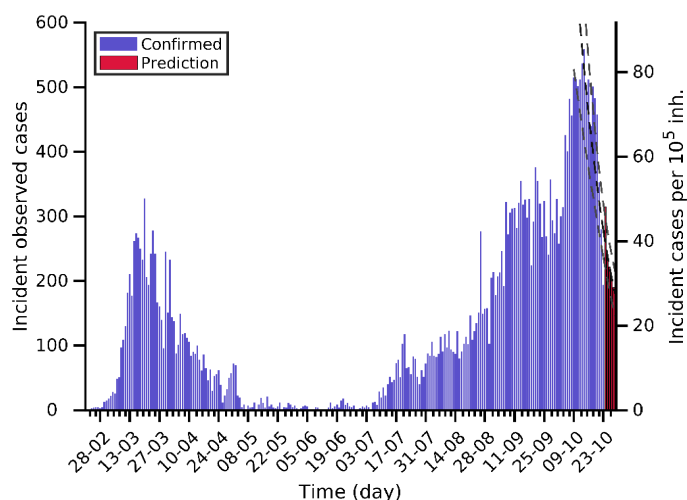


Predictions for next days

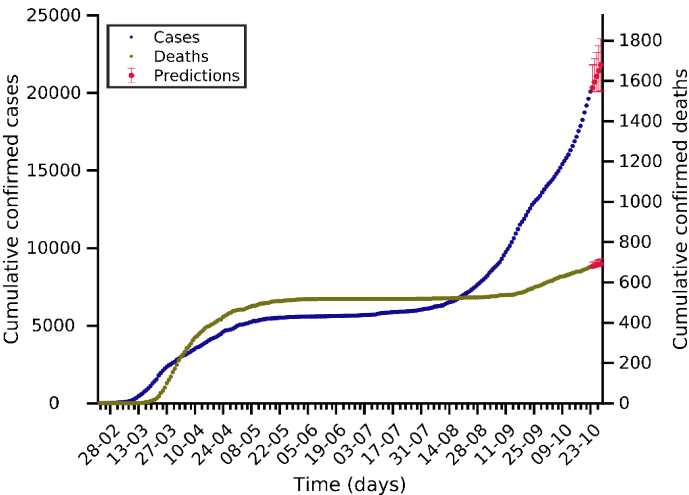
Day	Number of cases	95% Confidence Interval
24-10-2020	31706 (+315)	[31391 - 32753]
26-10-2020	32167 (+222)	[31391 - 33237]
28-10-2020	32561 (+190)	[31452 - 33670]

Current indicators

A ₁₄	EPG	CFR
969	810	1.46 %

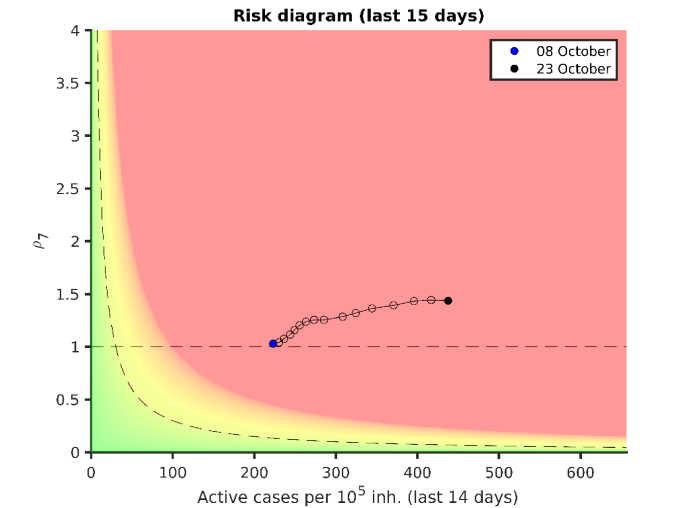
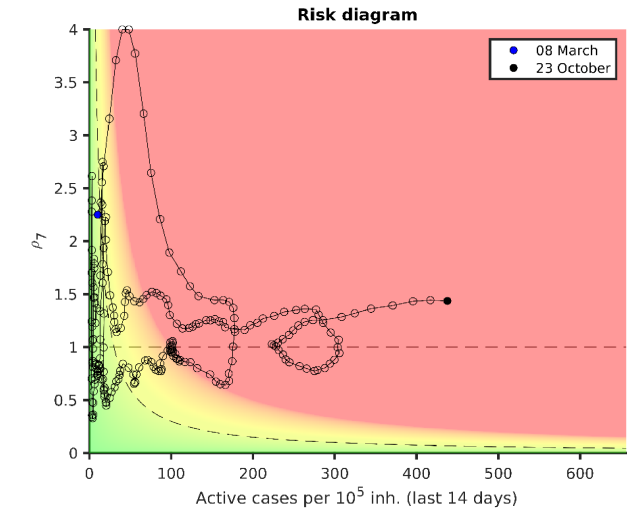
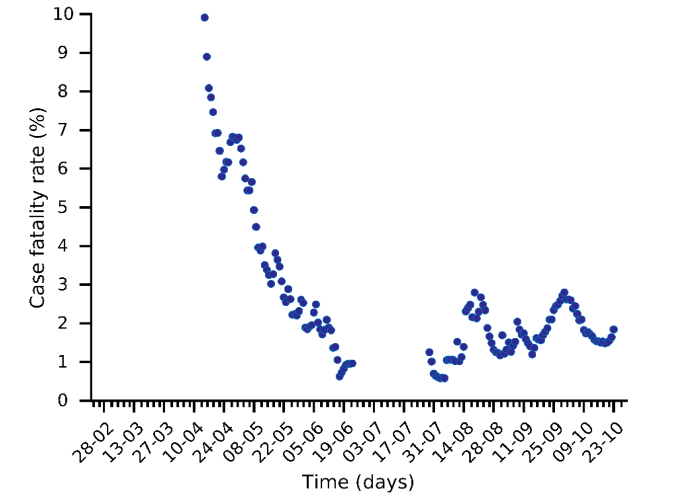
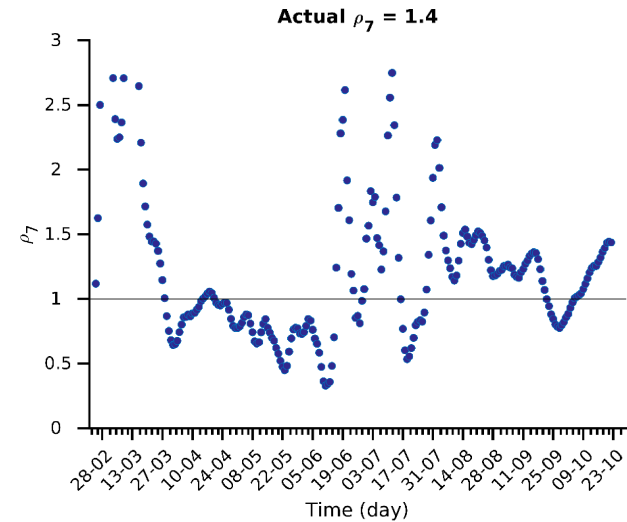
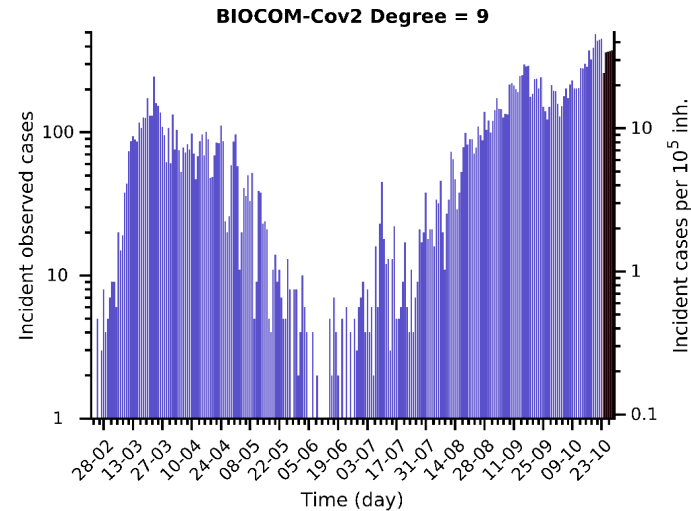
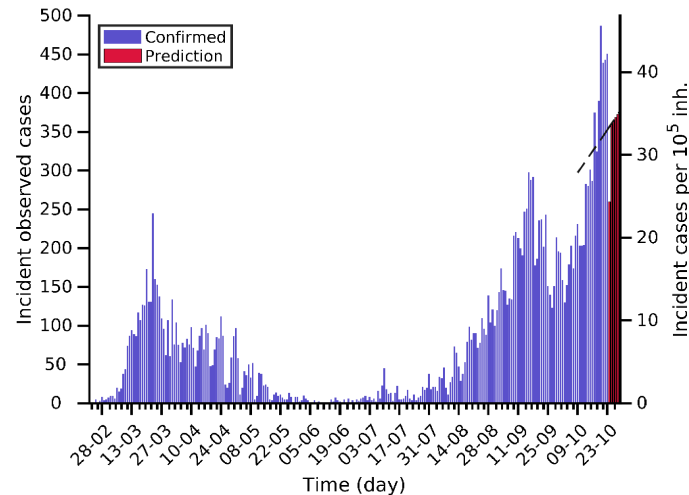


Extremadura 23-10-2020. Pop: 1.1M. Cumulative incidence: 1881/10⁵

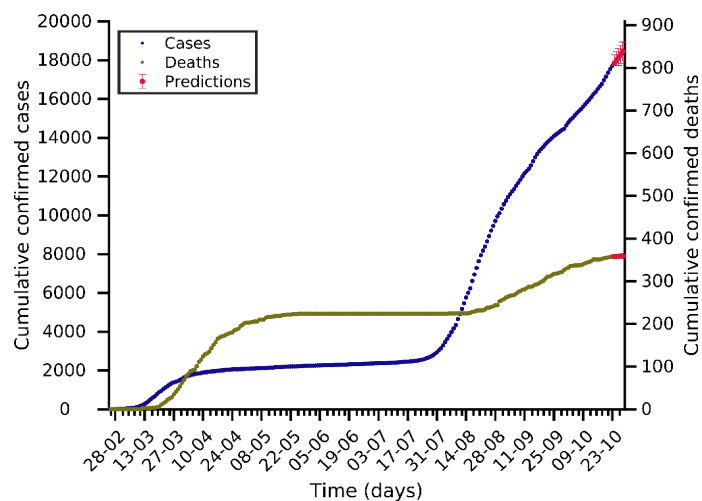


Predictions for next days		
Day	Number of cases	95% Confidence Interval
24-10-2020	20347 (+260)	[20087 - 21821]
26-10-2020	21072 (+365)	[20087 - 22612]
28-10-2020	21813 (+373)	[20124 - 23502]

Current indicators		
A ₁₄	EPG	CFR
437	629	1.84 %



Baleares 23-10-2020. Pop: 1.1M. Cumulative incidence: 1541/10⁵

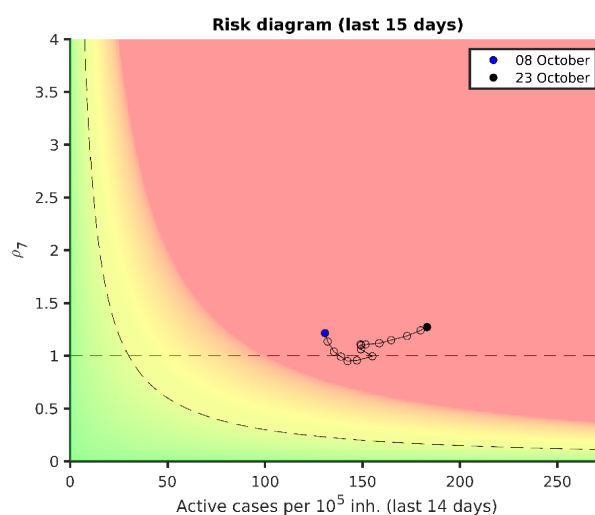
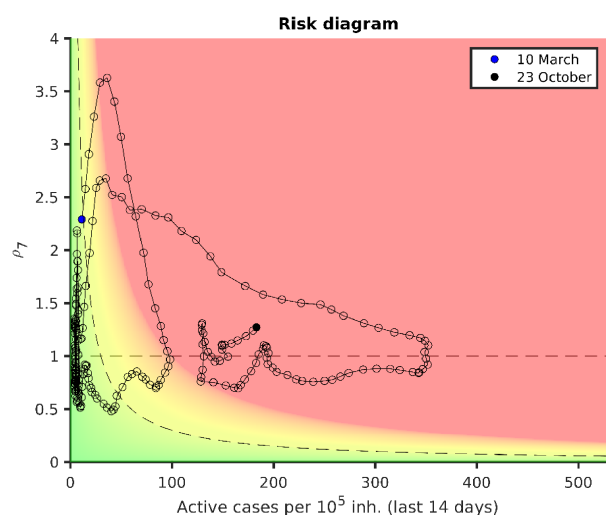
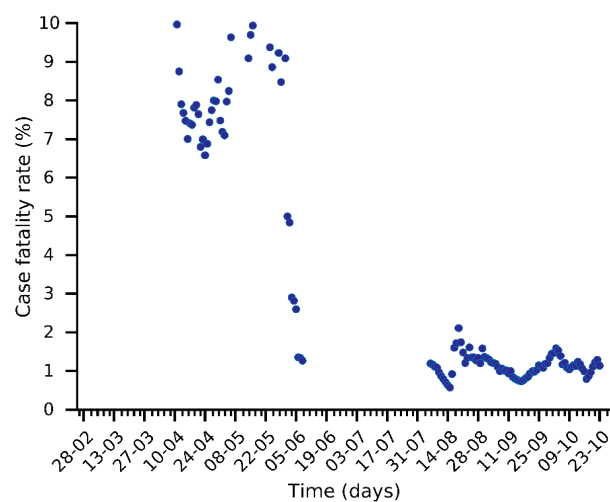
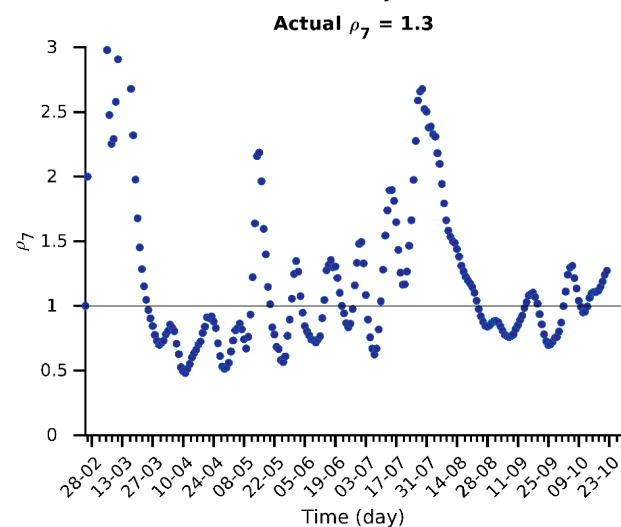
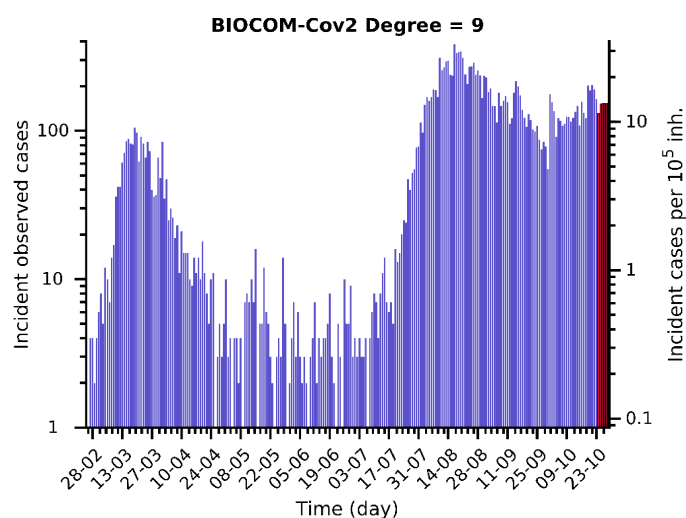
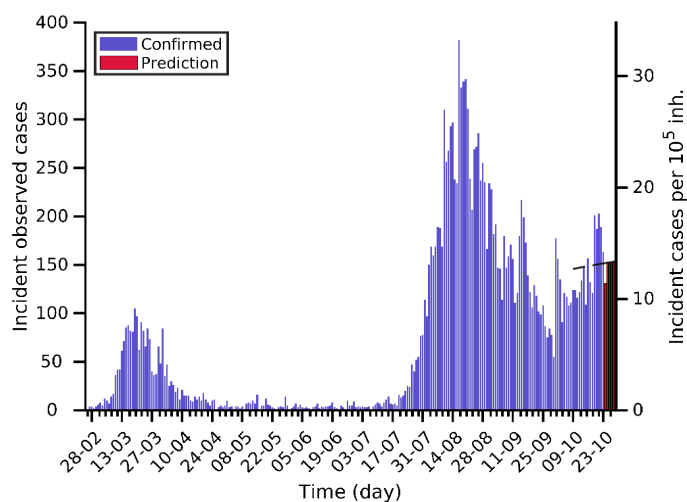


Predictions for next days

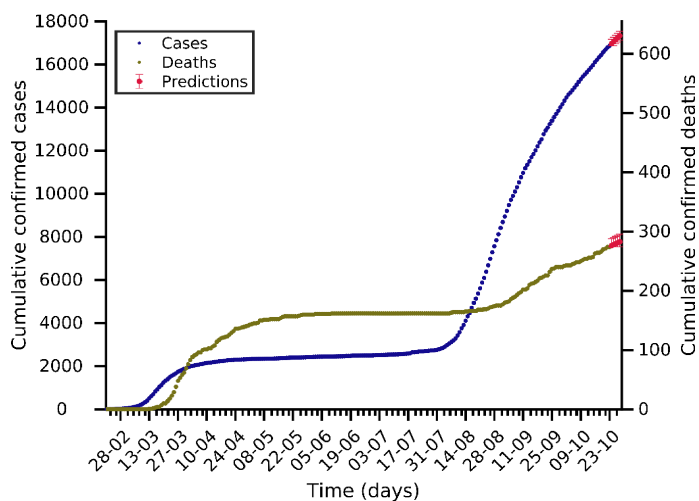
Day	Number of cases	95% Confidence Interval
24-10-2020	17846 (+131)	[17715 - 18277]
26-10-2020	18150 (+152)	[17715 - 18600]
28-10-2020	18456 (+153)	[17969 - 18944]

Current indicators

A ₁₄	EPG	CFR
183	233	1.14 %



Canarias 23-10-2020. Pop: 2.2M. Cumulative incidence: 784/10⁵

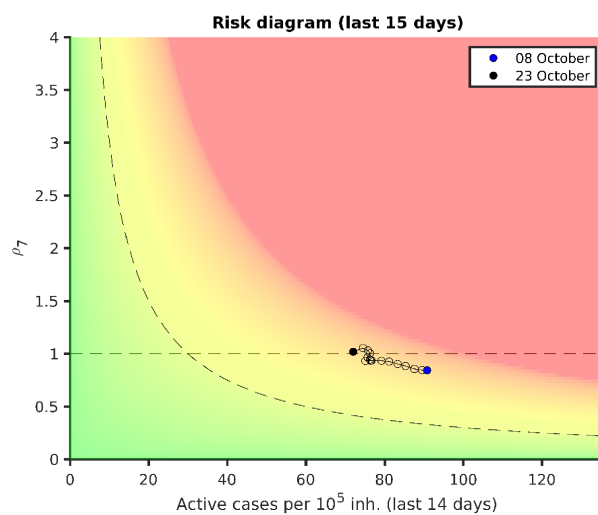
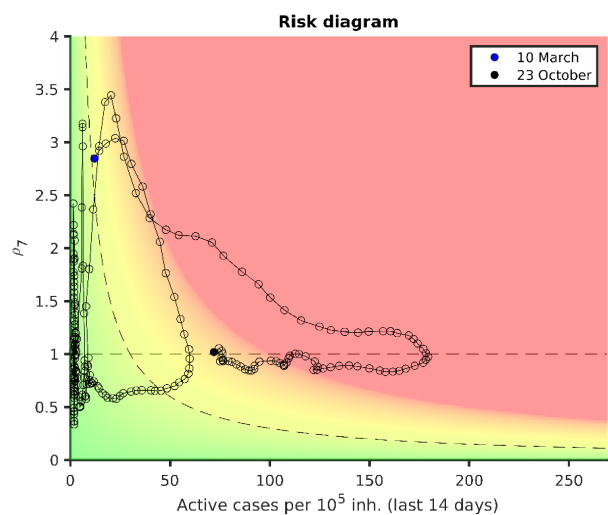
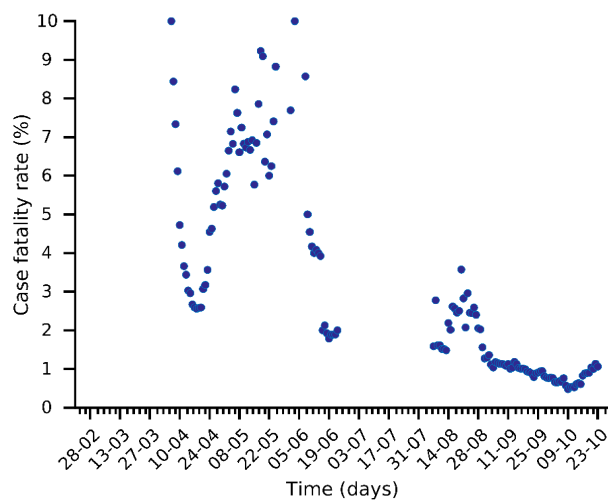
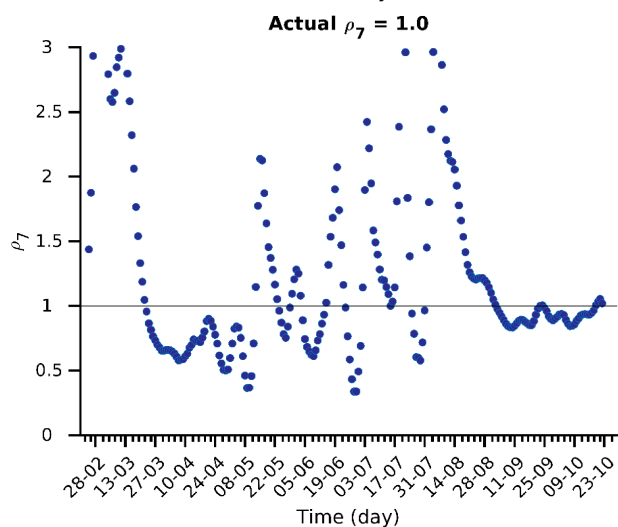
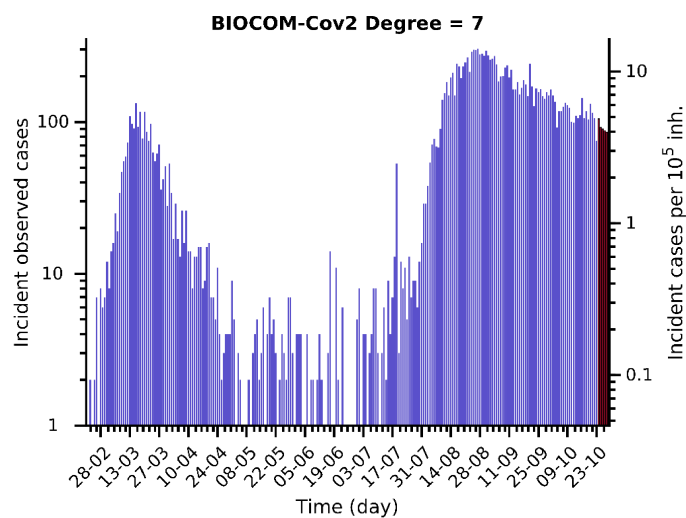
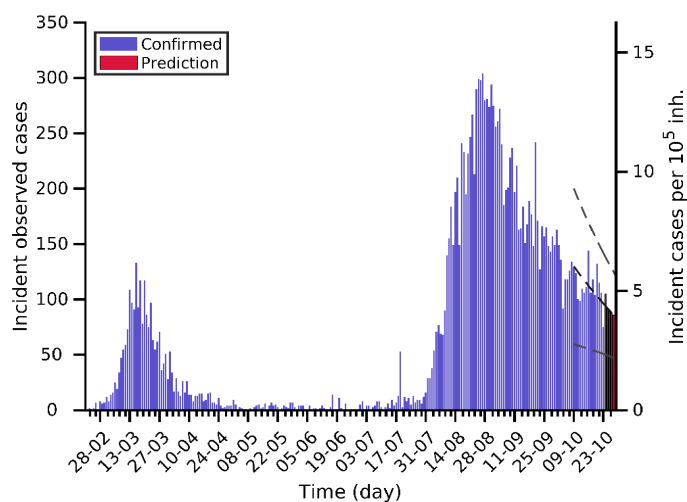


Predictions for next days

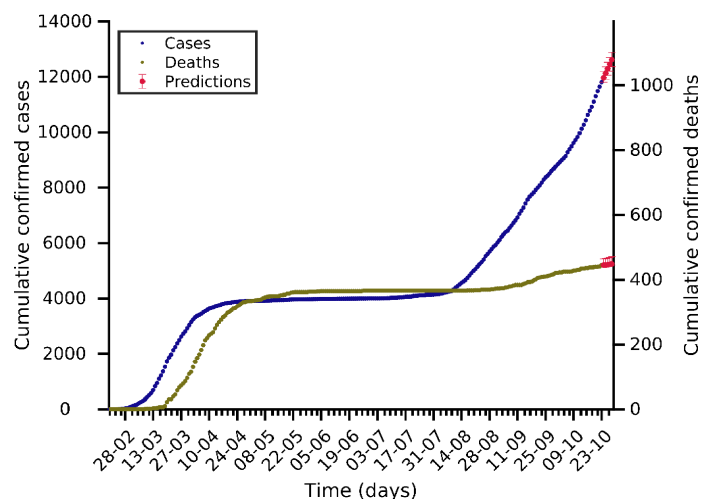
Day	Number of cases	95% Confidence Interval
24-10-2020	16978 (+105)	[16873 - 17166]
26-10-2020	17160 (+90)	[16965 - 17354]
28-10-2020	17334 (+86)	[17127 - 17541]

Current indicators

A ₁₄	EPG	CFR
72	73	1.06 %



La Rioja 23-10-2020. Pop: 0.3M. Cumulative incidence: 3727/10⁵

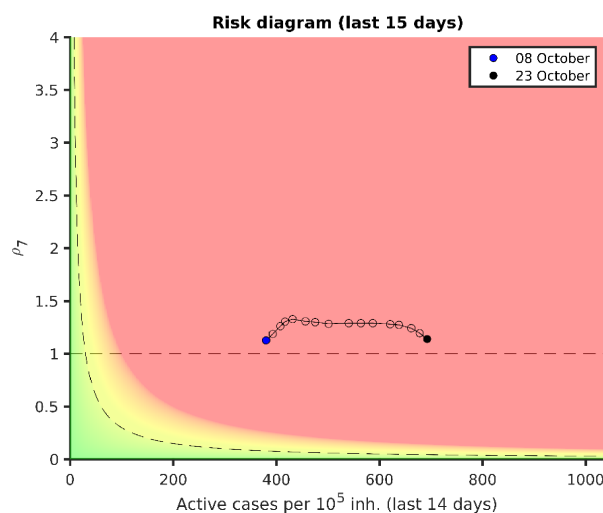
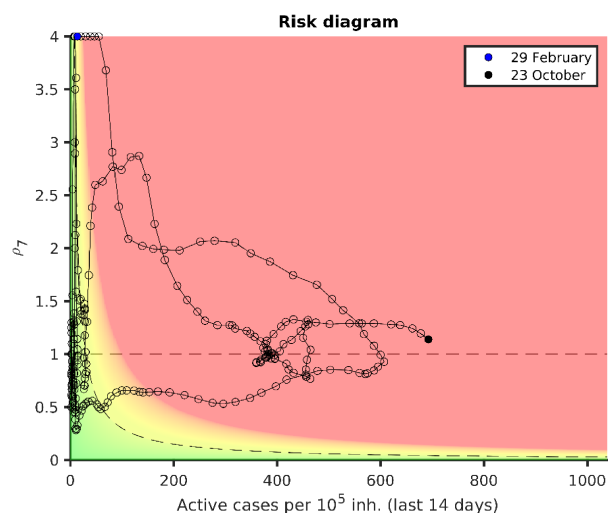
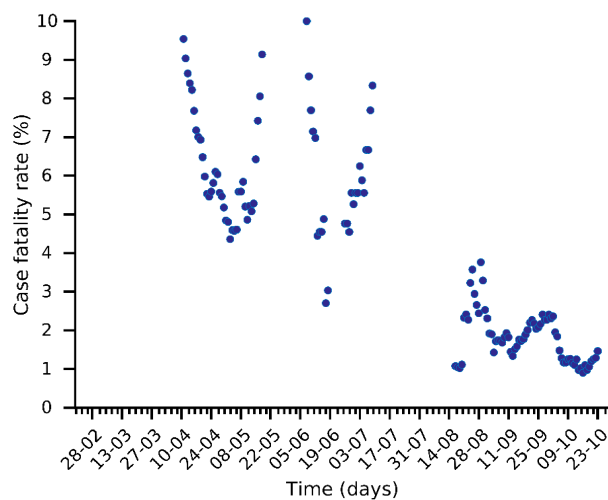
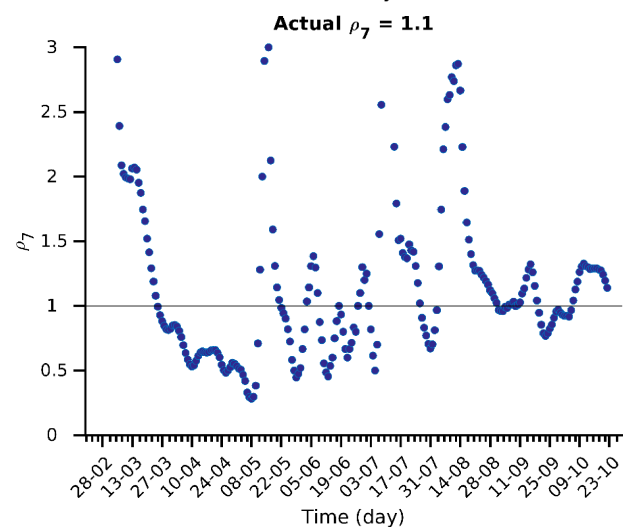
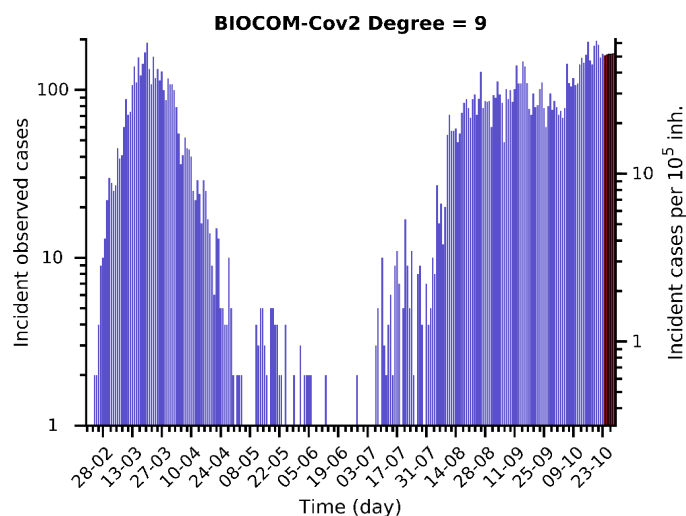
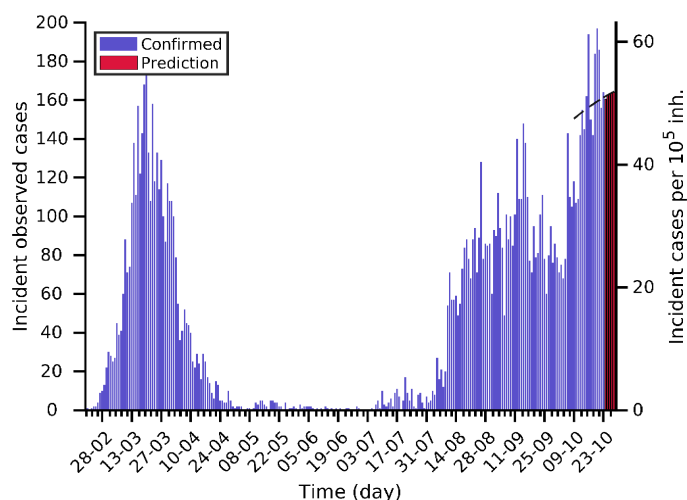


Predictions for next days

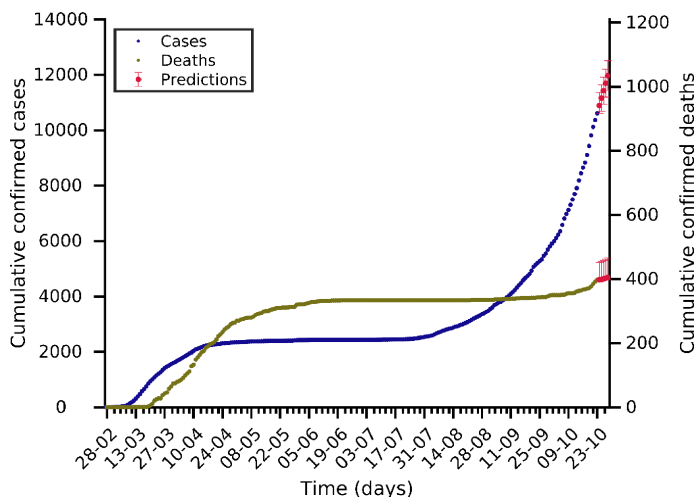
Day	Number of cases	95% Confidence Interval
24-10-2020	11968 (+160)	[11808 - 12196]
26-10-2020	12294 (+163)	[12058 - 12531]
28-10-2020	12622 (+164)	[12365 - 12880]

Current indicators

A ₁₄	EPG	CFR
692	789	1.46 %



Asturias 23-10-2020. Pop: 1.0M. Cumulative incidence: 1038/10⁵

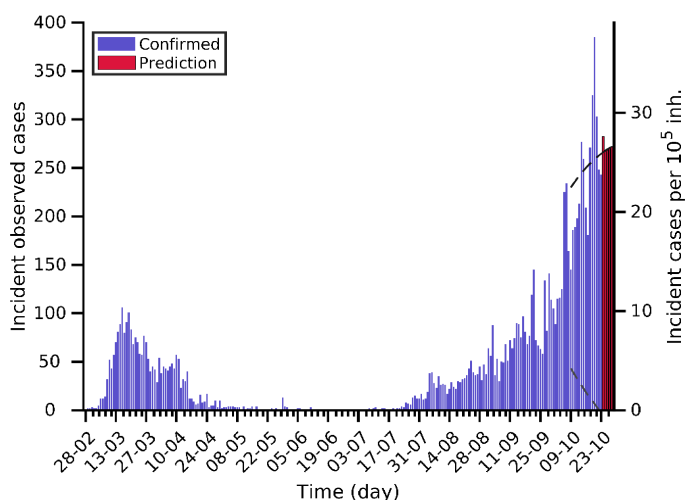


Predictions for next days

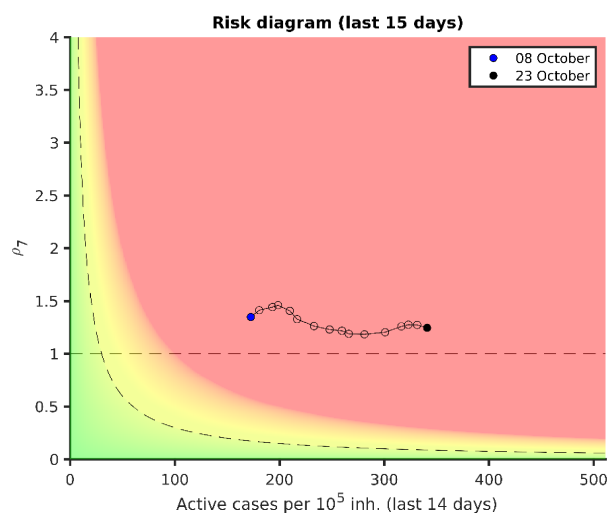
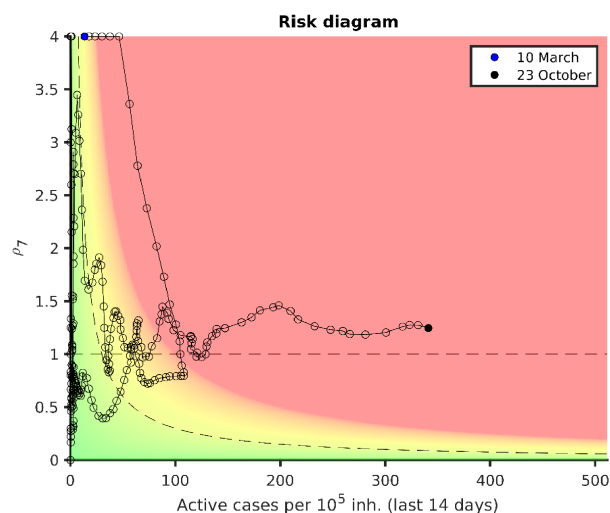
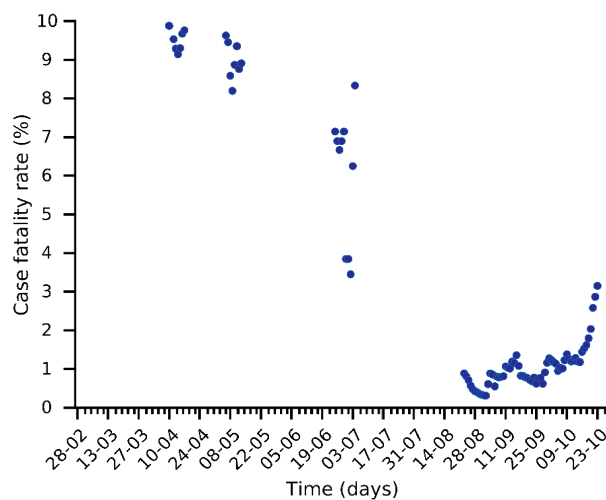
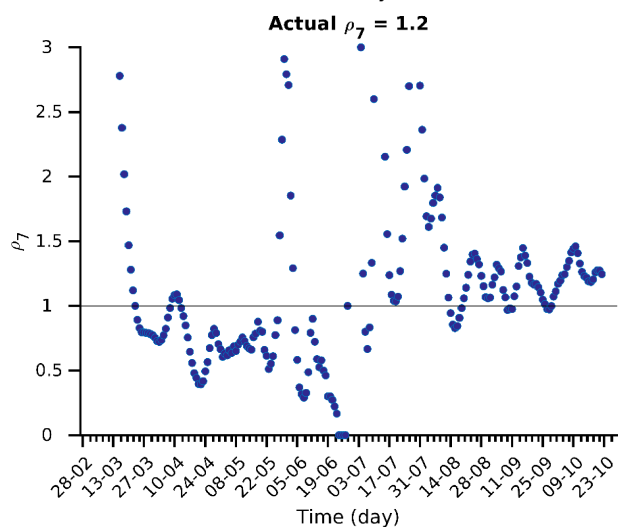
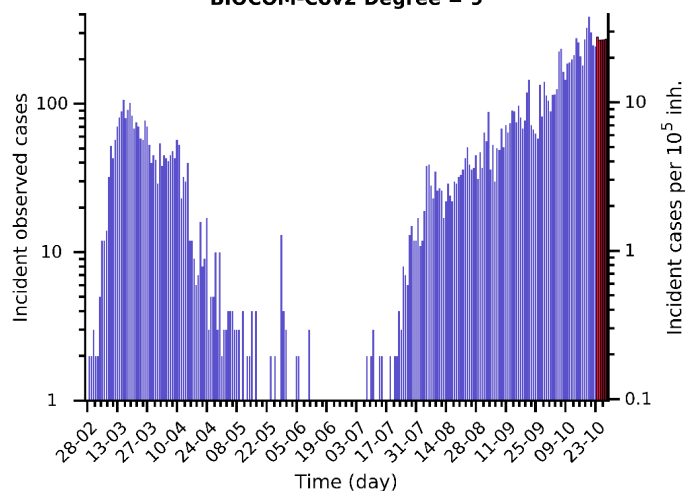
Day	Number of cases	95% Confidence Interval
24-10-2020	10894 (+282)	[10612 - 11363]
26-10-2020	11431 (+269)	[10942 - 11921]
28-10-2020	11974 (+272)	[11438 - 12509]

Current indicators

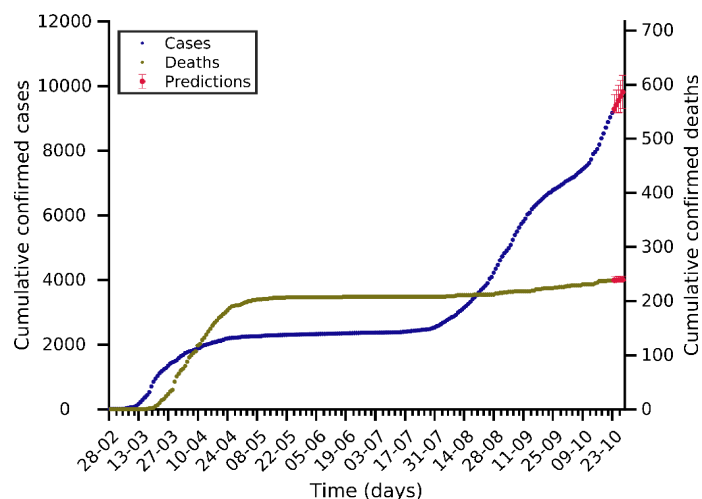
A ₁₄	EPG	CFR
341	425	3.15 %



BIOCOM-Cov2 Degree = 9



Cantabria 23-10-2020. Pop: 0.6M. Cumulative incidence: 1578/10⁵

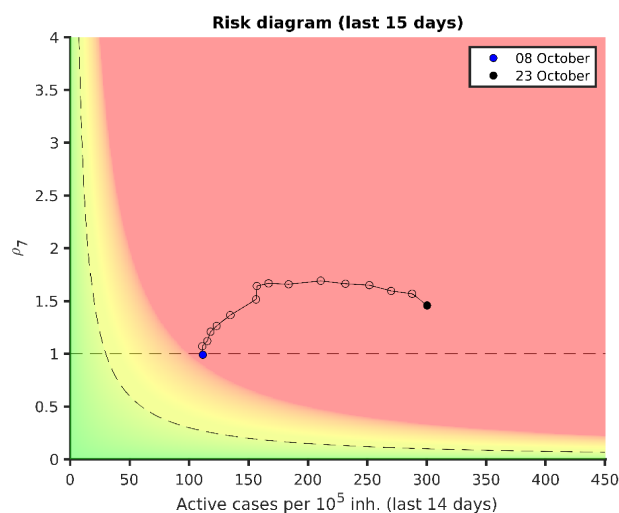
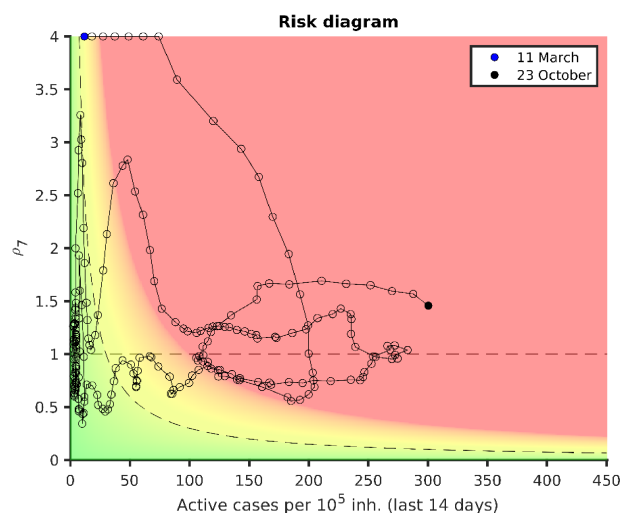
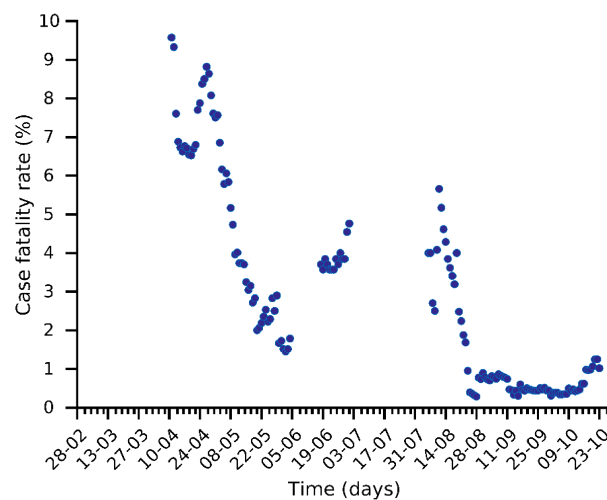
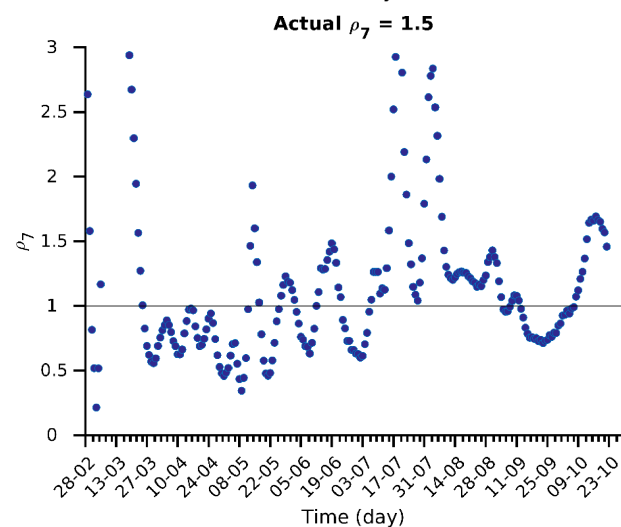
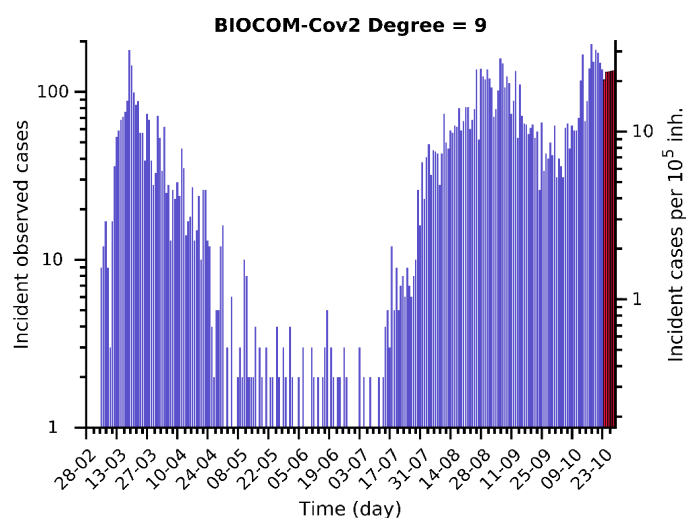
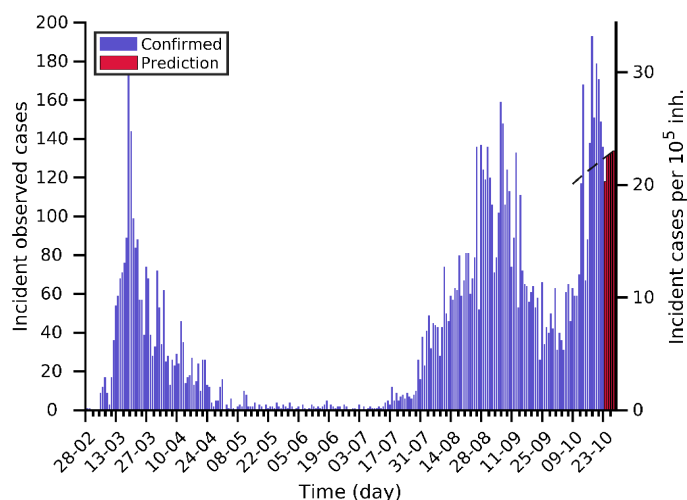


Predictions for next days

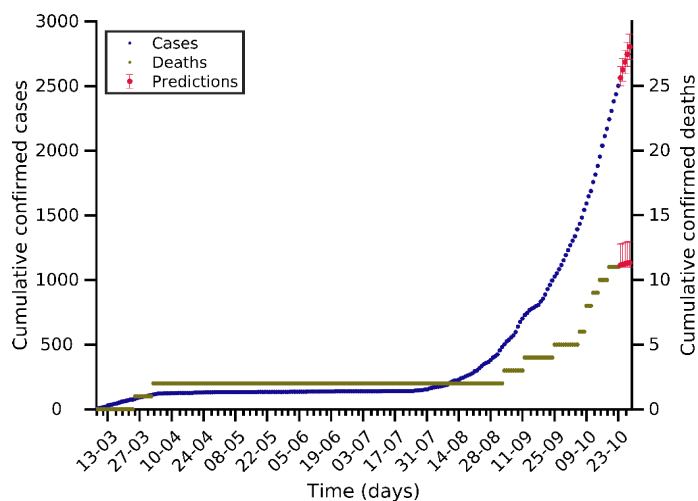
Day	Number of cases	95% Confidence Interval
24-10-2020	9289 (+118)	[9171 - 9739]
26-10-2020	9552 (+132)	[9171 - 10022]
28-10-2020	9819 (+134)	[9307 - 10331]

Current indicators

A ₁₄	EPG	CFR
300	438	1.02 %



Melilla 23-10-2020. Pop: 0.1M. Cumulative incidence: 2893/10⁵

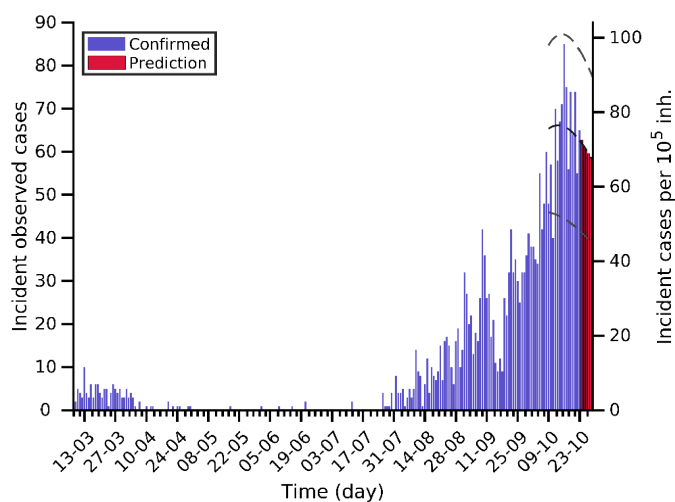


Predictions for next days

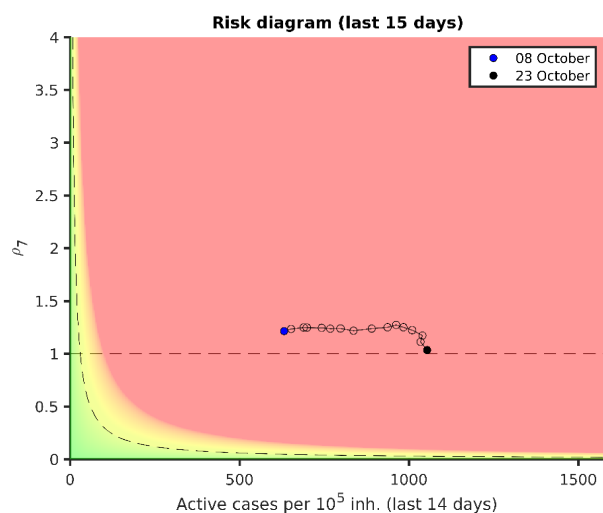
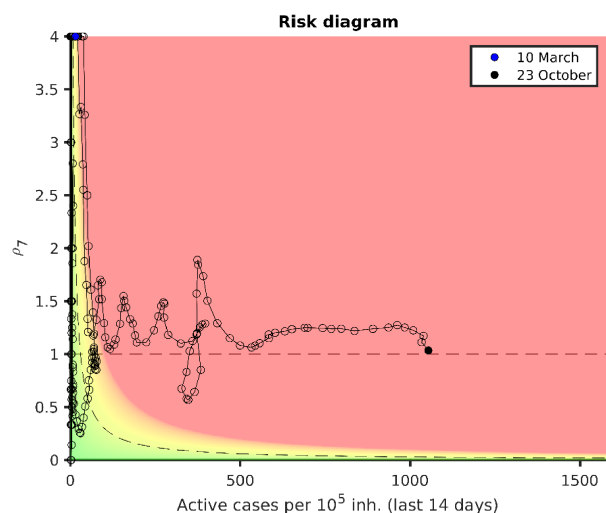
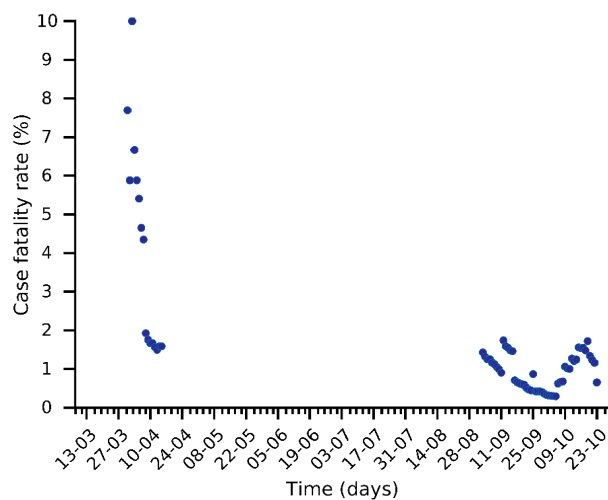
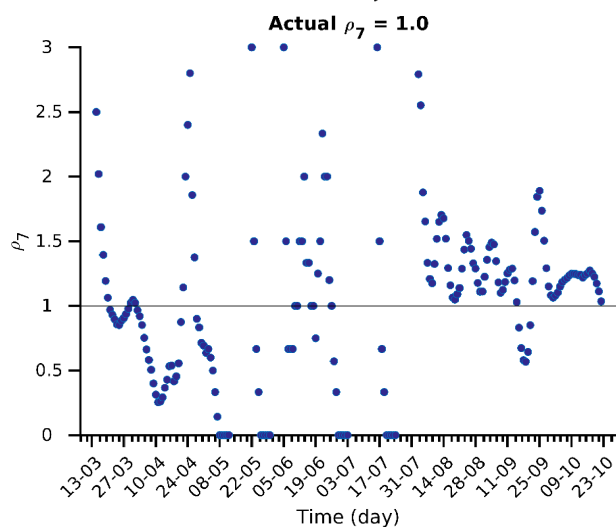
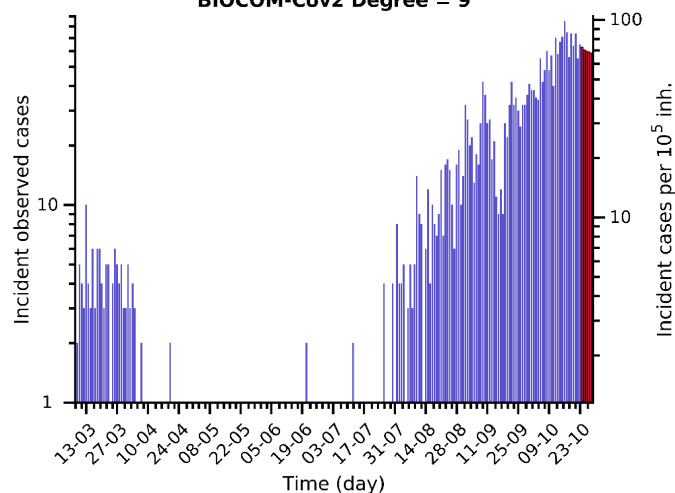
Day	Number of cases	95% Confidence Interval
24-10-2020	2565 (+63)	[2502 - 2651]
26-10-2020	2686 (+60)	[2597 - 2776]
28-10-2020	2805 (+59)	[2708 - 2901]

Current indicators

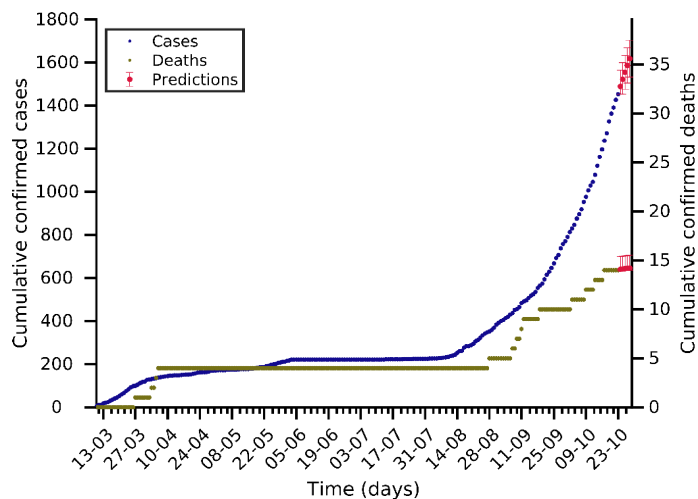
A ₁₄	EPG	CFR
1053	1090	0.65 %



BIOCOM-Cov2 Degree = 9



Ceuta 23-10-2020. Pop: 0.1M. Cumulative incidence: 1714/10⁵

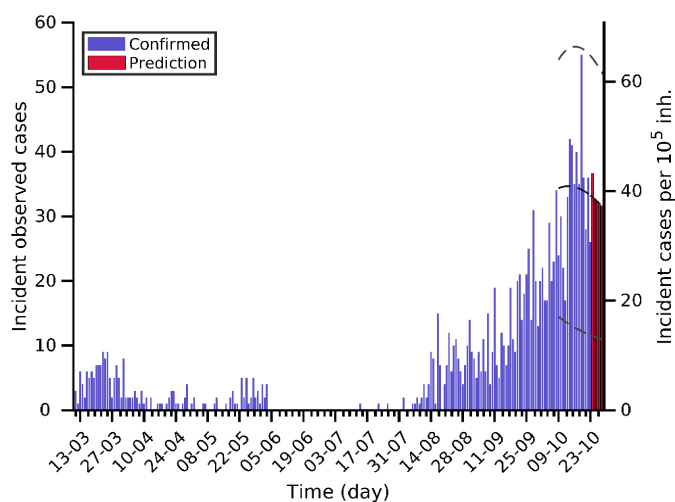


Predictions for next days

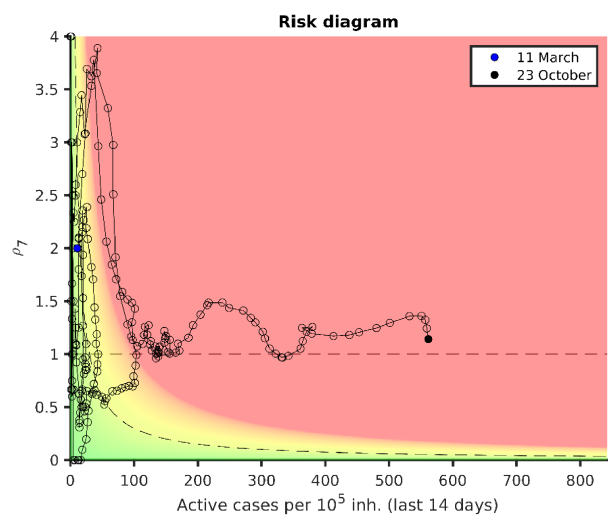
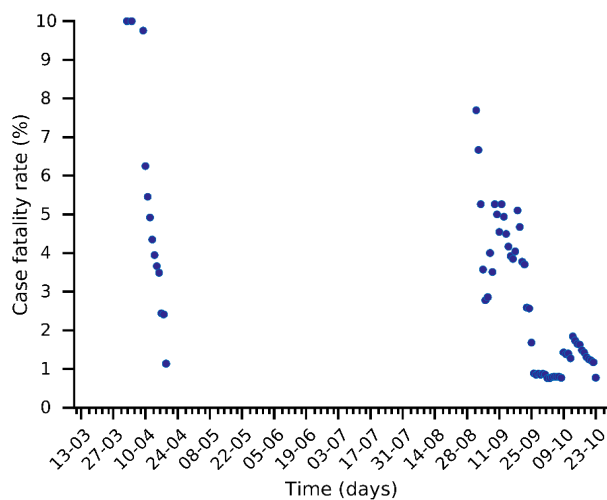
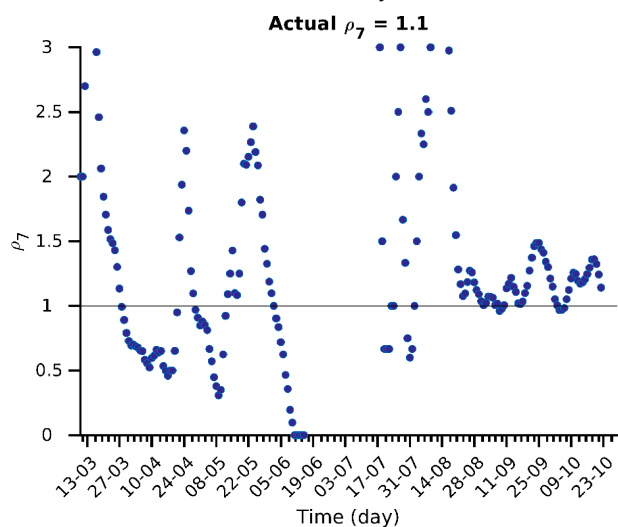
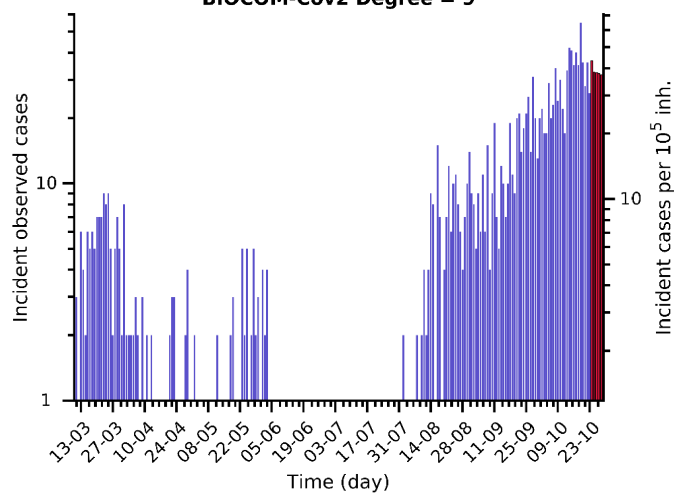
Day	Number of cases	95% Confidence Interval
24-10-2020	1490 (+37)	[1453 - 1565]
26-10-2020	1555 (+32)	[1476 - 1634]
28-10-2020	1618 (+32)	[1533 - 1704]

Current indicators

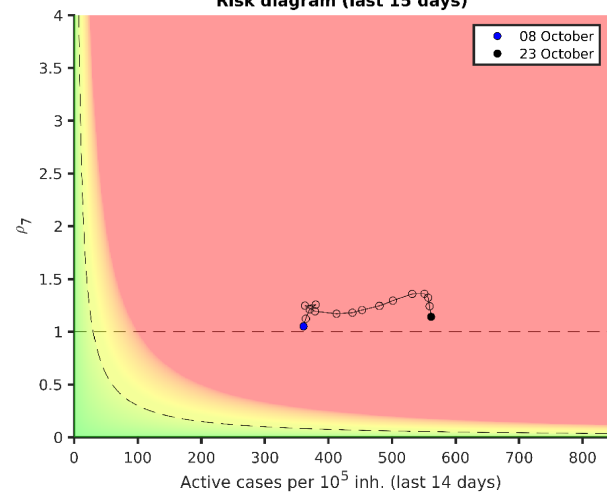
A ₁₄	EPG	CFR
561	641	0.77 %



BIOCOM-Cov2 Degree = 9



Risk diagram (last 15 days)



Methods

Methods

(1) Data source

Data are daily obtained from European Centre for Disease Prevention and Control (ECDC)⁶ and country official sources (when indicated). Daily data comprise, among others: total confirmed cases, total confirmed new cases, total deaths, total new deaths. It must be considered that the report is always providing data from previous day. In the document we use the date at which the datapoint is assumed to belong, i.e., report from 15/03/2020 is giving data from 14/03/2020, the latter being used in the subsequent analysis.

(2) Data processing and plotting

Data are initially processed with Matlab in order to update timeseries, i.e., last datapoints are added to historical sequences. These timeseries are plotted for individual countries and for the UE+EFTA+UK as a whole:

- ✓ Number of cumulative confirmed cases
- ✓ Number of reported new cases
- ✓ Number of cumulative deaths

Then, two indicators are calculated and plotted, too:

- ✓ Case fatality rate: number of cumulative deaths divided by the number of cumulative confirmed cases, and reported as a percentage; it is an indirect indicator of the diagnostic level.
- ✓ ρ : this variable is related with the reproduction number, i.e., with the number of new infections caused by a single case. It is evaluated as follows for the day before last report ($t-1$):

$$\rho(t-1) = \frac{N_{new}(t) + N_{new}(t-1) + N_{new}(t-2)}{N_{new}(t-5) + N_{new}(t-6) + N_{new}(t-7)}$$

where $N_{new}(t)$ is the number of new confirmed cases at day t after applying a 7-day moving average to the new cases dataset, so that fluctuations (e.g., weekend effect) are smoothed.

(3) Classification of countries according to their epidemic level: the scale Biocom-Cov

Countries are assigned a degree in the discrete Biocom-Cov scale, which aims to facilitate a simple way of assessing the situation of the country. It is based on the level of daily new cases per 100,000 inhabitants as follows:

Pandemic degree	Daily new incident cases per 10 ⁵ inh.
0	0
1	0-0.1
2	0.1-0.5
3	0.5-1.25
4	1.25-2
5	2-3
6	3-5
7	5-8
8	8-14
9	>14

⁶ <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>

(4) Fitting a mathematical model to data

Previous studies have shown that Gompertz model⁷ correctly describes the Covid-19 epidemic in all analysed countries. It is an empirical model that starts with an exponential growth but that gradually decreases its specific growth rate. Therefore, it is adequate for describing an epidemic wave that is characterized by an initial exponential growth but a progressive decrease in spreading velocity provided that appropriate control measures are applied. Once in the tail, predictions work but the meaning of parameters is lost.

Gompertz model is described by the equation:

$$N(t) = K e^{-\ln\left(\frac{K}{N_0}\right) \cdot e^{-a \cdot (t-t_0)}}$$

where $N(t)$ is the cumulated number of confirmed cases at t (in days), and N_0 is the number of cumulated cases the day at day t_0 . The model has two parameters:

- ✓ a is the velocity at which specific spreading rate is slowing down;
- ✓ K is the expected final number of cumulated cases at the end of the epidemic.

This model is fitted to reported cumulative cases of the UE and of countries that accomplish two criteria: 4 or more consecutive days with more than 100 cumulated cases, and at least one datapoint over 200 cases. Day t_0 is chosen as that one at which $N(t)$ overpasses 100 cases. If more than 15 datapoints that accomplish the stated criteria are available, only the last 15 points are used. The fitting is done using Matlab's Curve Fitting package with Nonlinear Least Squares method, which also provides confidence intervals of fitted parameters (a and K) and the R^2 of the fitting. At the initial stages the dynamics is exponential and K cannot be correctly evaluated. In fact, at this stage the most relevant parameter is a .

It is worth to mention that the simplicity of this model and the lack of previous assumptions about the Covid-19 behaviour make it appropriate for universal use, i.e., it can be fitted to any country independently of its socioeconomic context and control strategy. Then, the model is capable of quantifying the observed dynamics in an objective and standard manner and predicting short-term tendencies.

(5) Using the model for predicting short-term tendencies

The model is finally used for a short-term prediction of the evolution of the cumulated number of cases (3-5 days). The confidence interval of predictions is assessed with the Matlab function `predint`, with a 99% confidence level. These predictions are shown in the plots as red dots with corresponding error bar. For series longer than 9 timepoints, last 3 points are weighted in the fitting so that changes in tendencies are well captured by the model.

(6) Estimating non-diagnosed cases

Lethality of Covid-19 has been estimated at around 1 % for Republic of Korea and the Diamond Princess cruise. Besides, median duration of viral shedding after Covid-19 onset has been estimated at 18.5 days for non-survivors⁸ in a retrospective study in Wuhan. These data allow for an estimation of total number of cases, considering that the number of deaths at certain moment should be about 1 % of total cases 18.5 days before. This is valid for estimating cases of countries at stage II, since in stage I the deaths would be mostly

⁷ Madden LV. Quantification of disease progression. *Protection Ecology* 1980; **2**: 159-176.

⁸ Zhou et al., 2020. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*; March 9, doi: 10.1016/S0140-6736(20)30566-3

due to the incidence at the country from which they were imported. We establish a threshold of 50 reported cases before starting this estimation.

Reported deaths are passed through a moving average filter of 5 points in order to smooth tendencies. Then, the corresponding number of cases is found assuming the 1 % lethality. Finally, these cases are distributed between 18 and 19 days before each one.